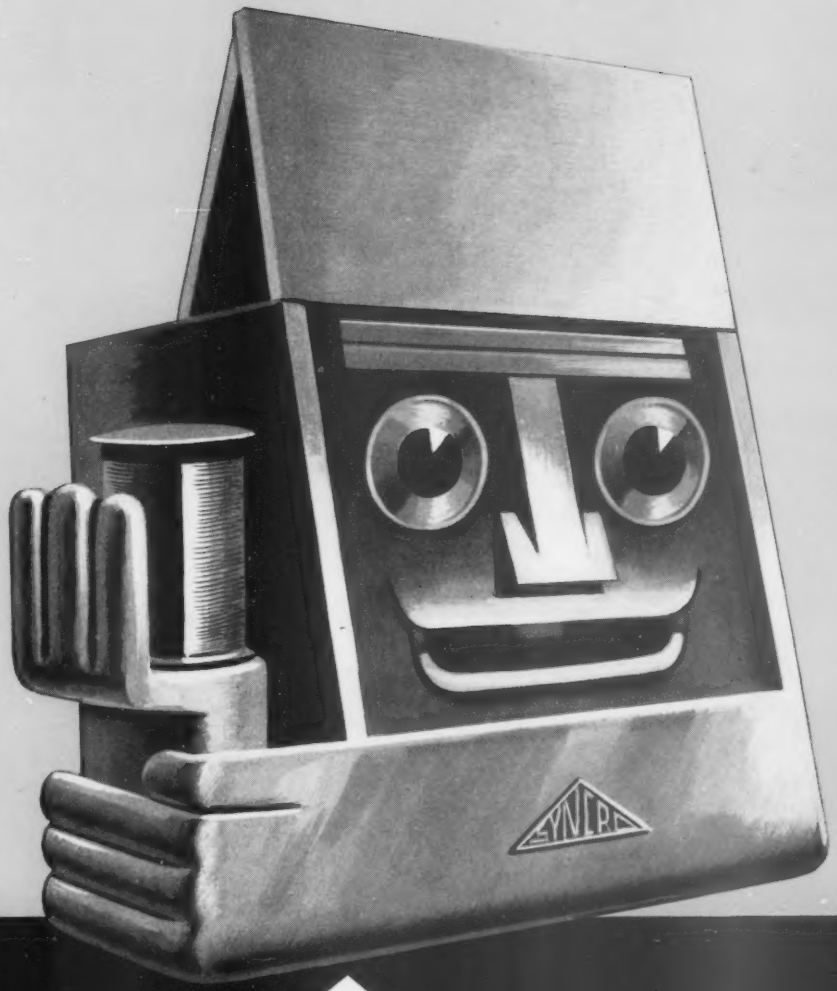
FEBRUARY 1957

WIRE AND WIRE PRODUCTS



IF A SYNCRO MACHINE COULD TALK

. . . It might very well deliver a lecture . . . on geography, or engineering, or even economics. For the talented SYNCRO machines are intercontinental citizens. They have found homes in wire and cable mills all over the world.

Under the subject of engineering, a SYNCRO machine might speak at great length on unmatched design, or the engineering and manufacturing skills that make every SYNCRO product a production line leader.

Economics, too, is a favorite subject of this able orator. Drawing more wire at less cost is the economic factor designed into every SYNCRO product. Yes, economical performance is as much a part of the SYNCRO machine as the metal of which it is made.

SYNCRO®

SYNCRO MACHINE COMPANY

Perth Amboy, New Jersey, U.S.A.

affiliated company: WINGET SYNCRO Ltd. Rochester Kent, England

Better Machinery for the Wire Industry

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

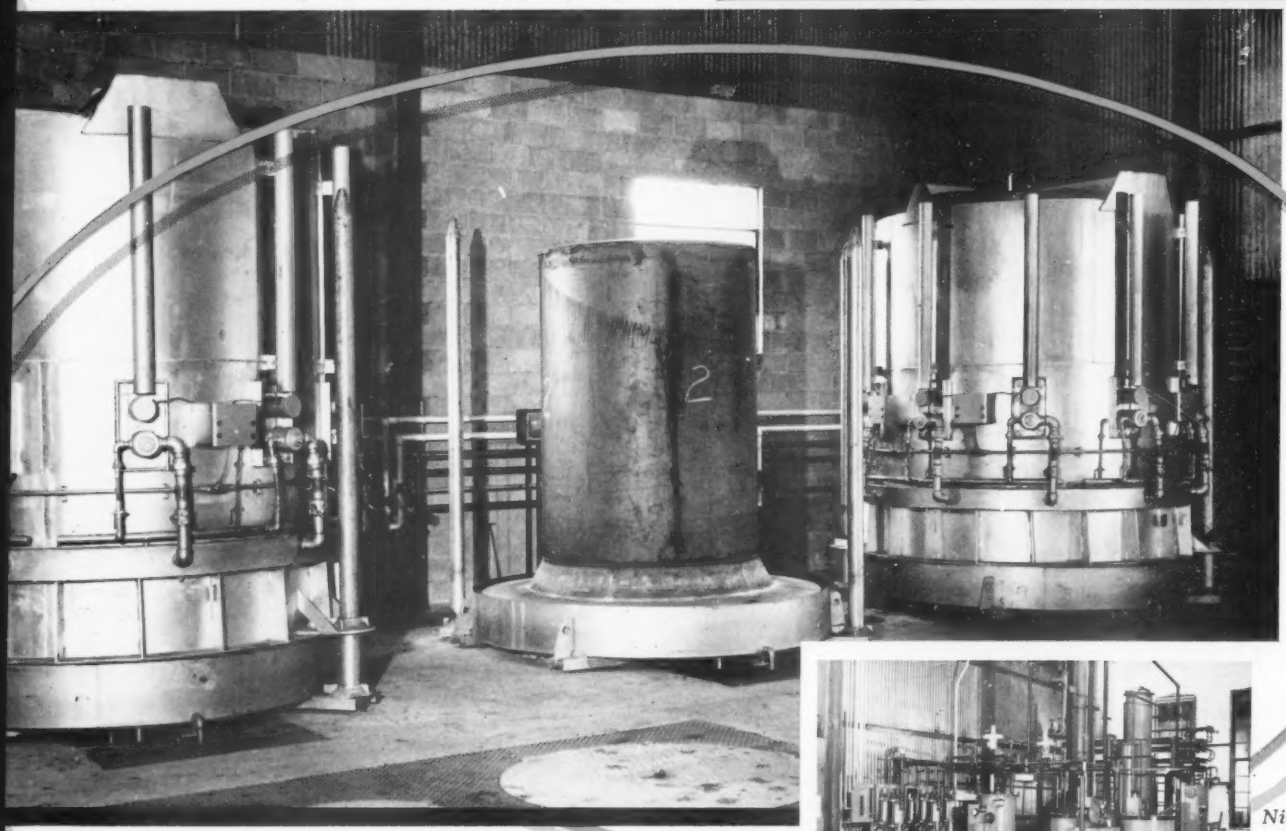
OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

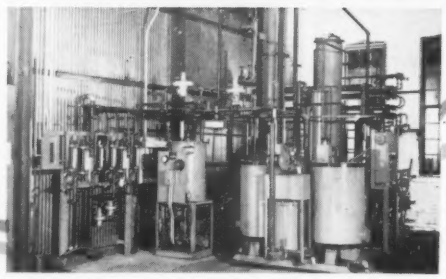
Typical charge of three stems of high carbon drawn wire.

High Convection Annealing

FOR HIGH CARBON STEEL COILS

Another Lee Wilson high convection wire annealing installation—two furnaces, three bases—charge size: 54" diameter, piling height, 90"





Nitrogen gas generating plant with gas drying equipment.

Special Lee Wilson high velocity dry nitrogen annealing system gives Kidd Drawn Steel highest quality high carbon wire and rod.

Kidd Drawn Steel Company of Aliquippa, Pennsylvania, recently installed two special Lee Wilson high convection annealing furnaces to anneal rod and wire coils of the higher carbon analyses. SAE specifications numbers 1095, 52100, 6150, 8635 and 8650 are the usual type of steels that are processed with dry nitrogen gas to prevent any decarburization during the annealing cycle. Equipment is provided with means for carbon restoration cycles when required.

Lee Wilson® ENGINEERING COMPANY, INC.
20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

HIGH CONVECTION ANNEALING FURNACES
MAKE THE BEST METALS BETTER

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2. - 304 Powder—for Drawing Multiple Drafts of Zig-Zag Spring Wire.
3. - 306 Powder—for Drawing Multiple Drafts of X-Clean Bright Wire.
4. - 405 Powder—for Drawing Multiple Drafts Smut Free, for Annealing.
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Standard Industrial
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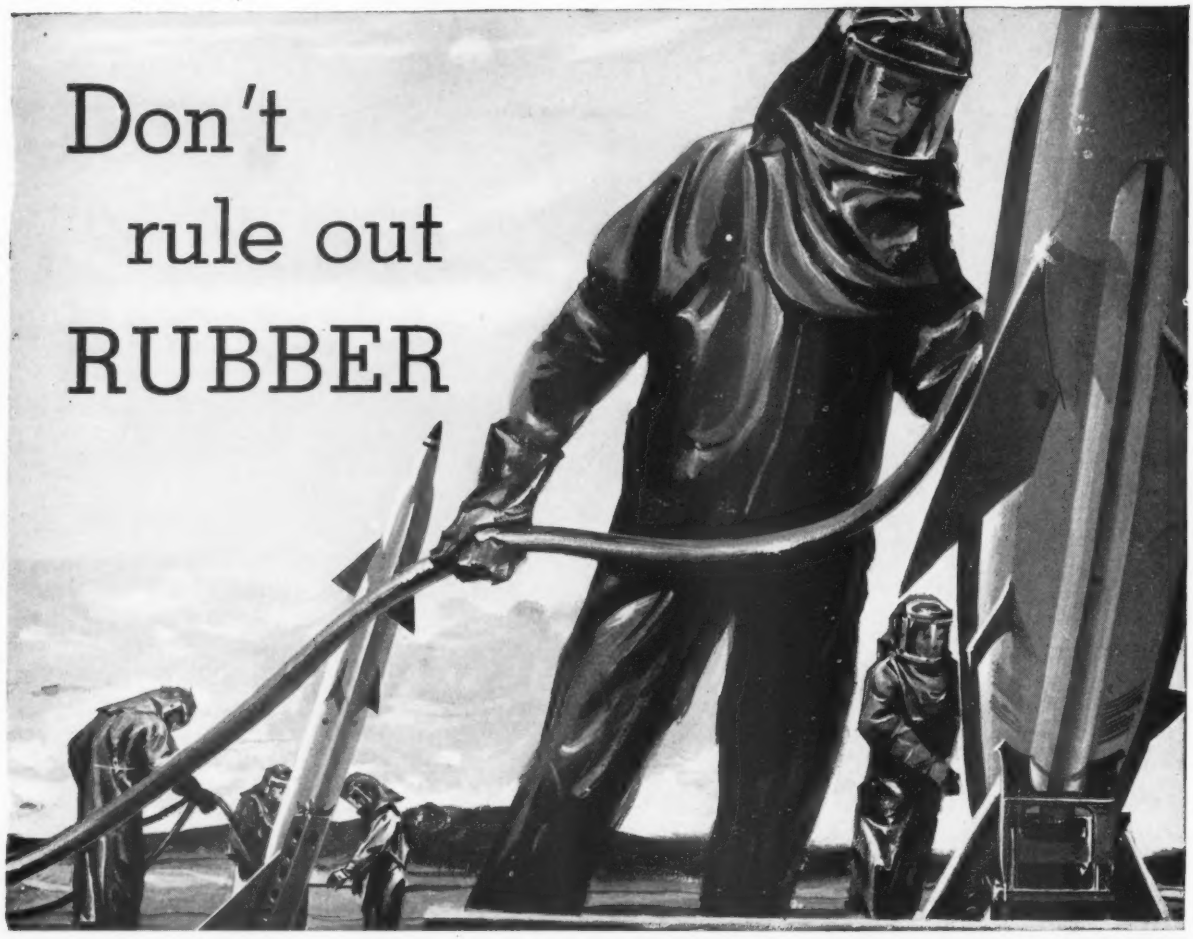
(A suburban Chicago area city)
TELEPHONES: 2131 — 2141



Transfer Hose of KEL-F Elastomer handles red fuming nitric acid over long periods of time without deteriorating. **Protective Clothing** of elastomer-coated fabric shields workers from corrosive materials.

KEL-F® Fluorocarbon Elastomers are doing jobs that rubber never did before!

Rubber is perhaps the most useful and versatile non-metallic material used by industry today. Its resilience and resistance to abrasion and breakdown make it an important tool in industrial techniques and plant equipment.

Yet in many applications—where the mechanical properties of rubber are vitally needed—extremely high-temperature and corrosive operating conditions rule out its use.

The development of KEL-F Fluorocarbon Elastomer fills a long felt need. Here is a high strength rubber that can operate effectively under conditions that swell, stretch and melt ordinary rubber.

Today, KEL-F Elastomer can be considered for those jobs once thought "impossible" for rubber. Just check its outstanding properties:

- Extreme resistance to acids, ozone, and other oxidants
- Thermal stability to 400°F.
- High resistance to solvents, fuels and lubricants
- Low moisture absorption
- Good dielectric properties
- Non-flammability

KEL-F Elastomers have convincingly demonstrated their value in a variety of industrial roles: As *sealants* for corrosive liquids, abrasion and corrosion resistant *pump impellers* . . . heat and chemical resistant *hose, tubing, diaphragms, gaskets . . . transmission, brake* and *aircraft seals* . . . corrosion and flame resistant *protective clothing* . . . electrical and shock *insulation.*

This new elastomer is a result of Kellogg's comprehensive research in fluorocarbon chemistry. Its performance characteristics are well established in the chemical, electrical and equipment fields. If your work involves rubber at any point, then KEL-F Elastomer warrants investigation.

Our Technical Staff is prepared to work with you in adapting KEL-F Elastomer to your needs. For further information, write: The M. W. Kellogg Company, Chemical Manufacturing Division, P. O. Box 469, Jersey City 3, N. J.

THE M. W. KELLOGG COMPANY

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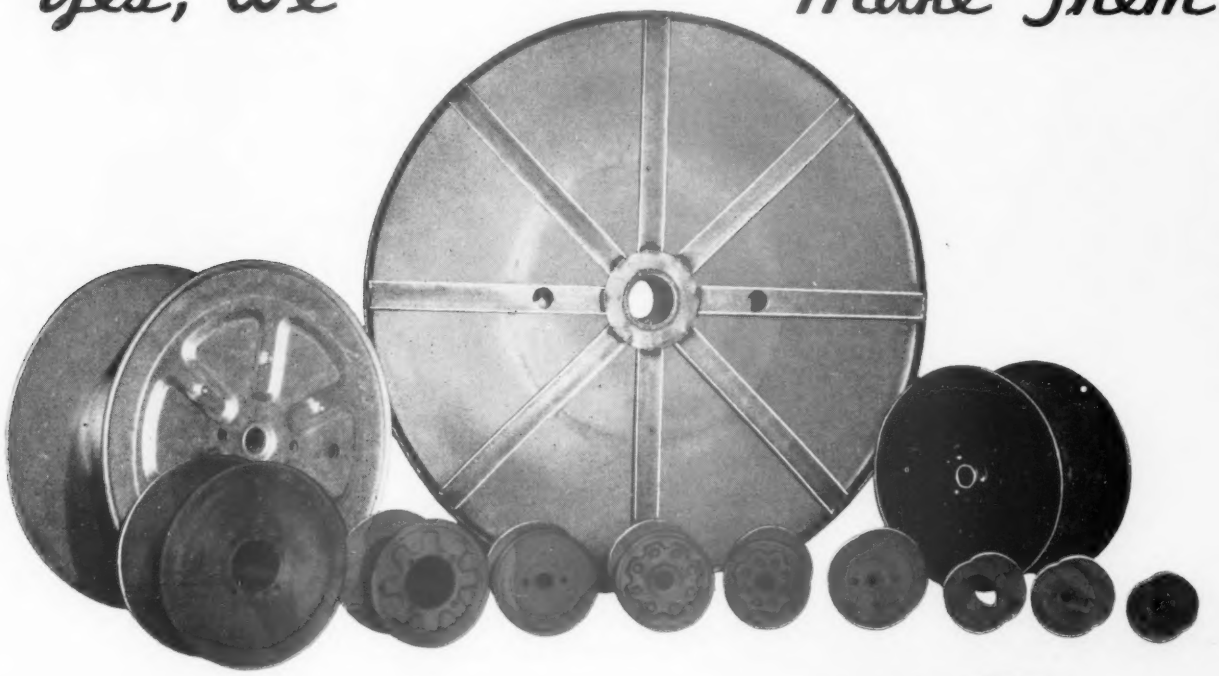
Yes, We Make Them!



Many types and constructions of Steel Spools and Reels for Shipping and Shop use in plain, painted or plated finishes.

In addition to our standard sizes of Steel Spools, we also have facilities and equipment for producing custom designed Spools and Reels to customers' specifications.

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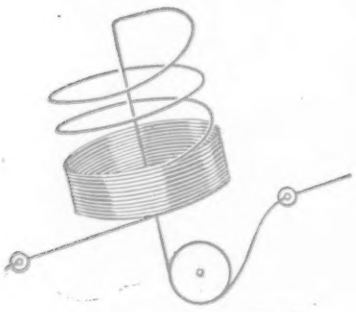

If you want
High Speed Wire Drawing

You must have
High Efficiency Wire Cooling

The Morgan-Connor System of Air Cooling is proving its superiority in many mills.

Ask about it.

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WORCESTER, MASS.

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WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 32 February, 1957 No. 2

Designated as Official Publication By The Wire Association

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WIRE and WIRE PRODUCTS is indexed regularly by Engineering Index, Inc., New York, N. Y.

RICHARD E. BROWN, President and Publisher

R. S. Spengel, Secy.-Treas. & Gen'l. Manager
J. Edward Donnellan, Vice-President

Edmund D. Sickels, Editor

— ASSOCIATE EDITORS —
Lancaster, Allwine & Rommel, Consultants on Patent Information

Publication Office: Jersey City, N. J.
Executive Office: 453 Main St., Stamford, Conn.
* Reg. U. S. Pat. Off.

WIRE & WIRE PRODUCTS, Vol. 32, No. 2, February, 1957. Publication Office at One Sherman Avenue, Jersey City, N. J. Executive Office 453 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Sec'y and Treas. Subscription Price: U. S. $8.00; Canada, $8.00 per year; Domestic 75 cents per copy; Foreign 90 cents per copy, except October Convention Issue and January Proceedings Issue, $1.25 per copy; Foreign $10.50 per year. Entered as second class matter at the Post Office, Jersey City, N. J. under the act of March 3, 1879.

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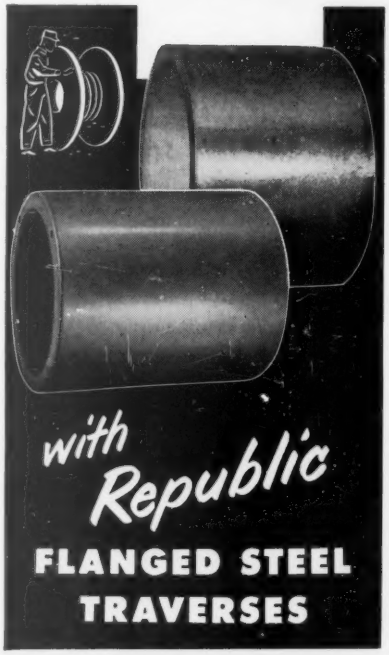
4 STEP
ASSEMBLY
For Wire and Cable Reels



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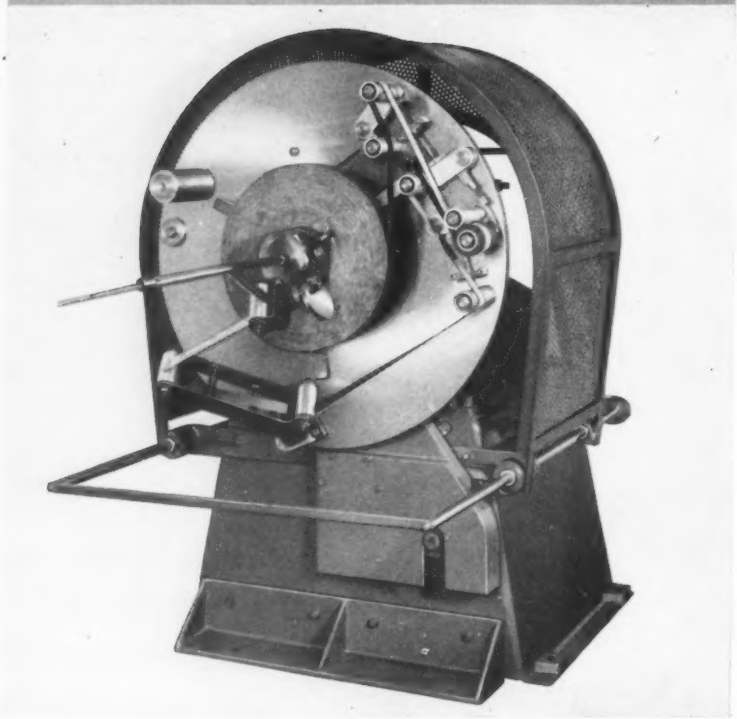
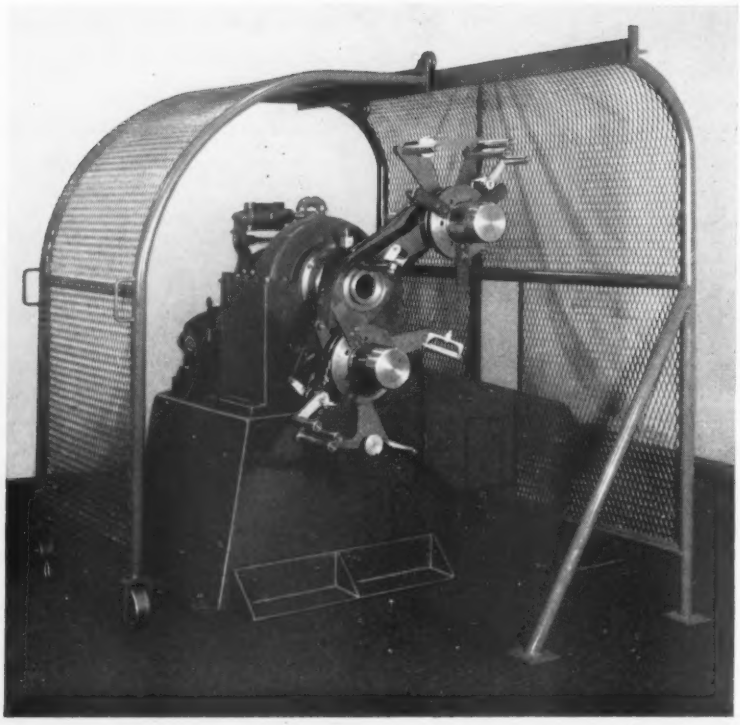
High Speed TAPING MACHINES



For Fast, Accurate Application of Paper, Cambric, Natural or Synthetic Rubber on Electric Cables.

Nebuttco High Speed Taping Machines are available in single or multiple head units equipped with motor drive, capstan and take-up. Individual units designed to operate with other types of equipment can be furnished to meet your specific requirements.

Nebuttco Concentric Machines are engineered to operate at a maximum speed of 650 RPM with tape pads 24″ diameter x 4″ wide x 6″ eye.



Nebuttco Eccentric Machines are made with from one to four tape pads. Maximum speed of 300 RPM with tape pad 20″ diameter x 4″ wide x 3½″ eye.

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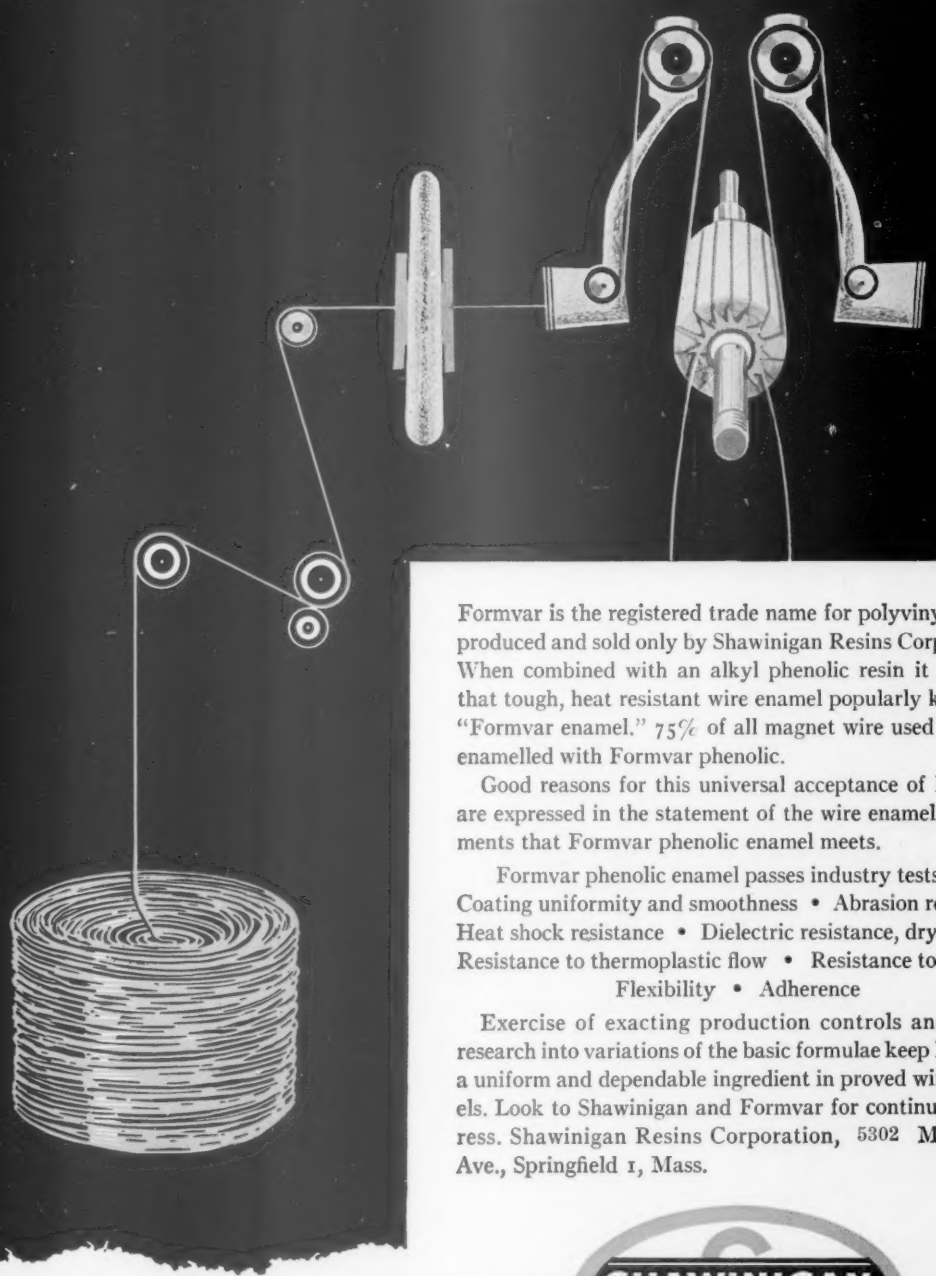
the name everybody depends on!



Formvar is the registered trade name for polyvinyl formal produced and sold only by Shawinigan Resins Corporation. When combined with an alkyl phenolic resin it becomes that tough, heat resistant wire enamel popularly known as "Formvar enamel." 75% of all magnet wire used today is enamelled with Formvar phenolic.

Good reasons for this universal acceptance of Formvar are expressed in the statement of the wire enamel requirements that Formvar phenolic enamel meets.

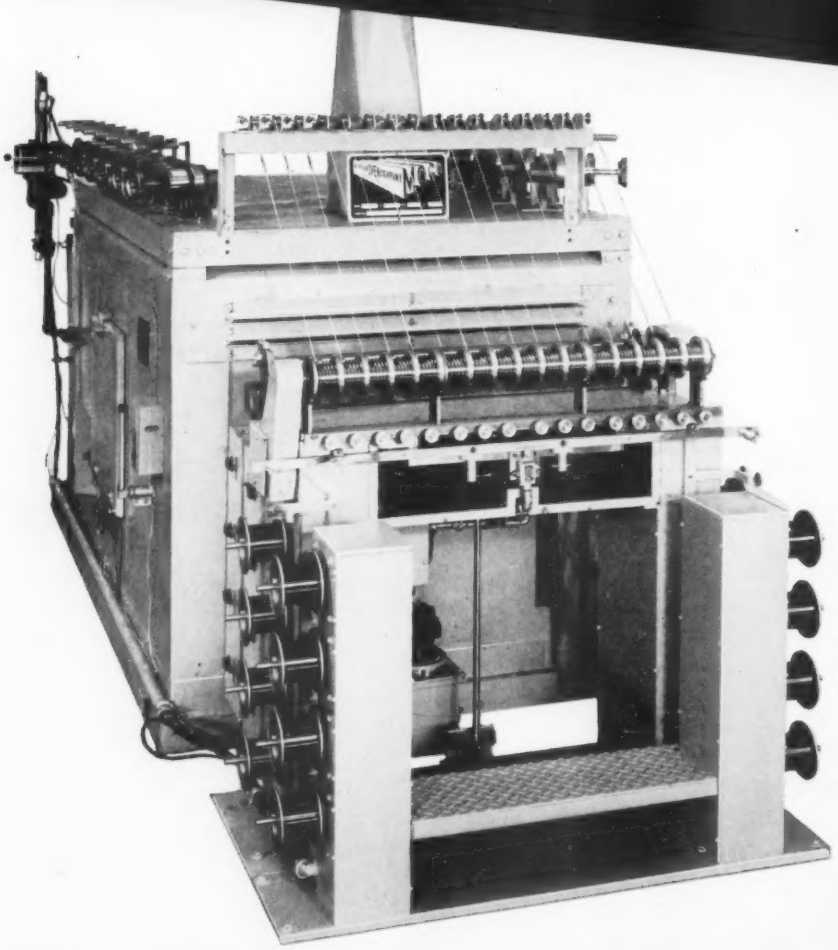
Formvar phenolic enamel passes industry tests for:
Coating uniformity and smoothness • Abrasion resistance
Heat shock resistance • Dielectric resistance, dry and wet
Resistance to thermoplastic flow • Resistance to solvents
Flexibility • Adherence

Exercise of exacting production controls and active research into variations of the basic formulae keep Formvar a uniform and dependable ingredient in proved wire enamels. Look to Shawinigan and Formvar for continued progress. Shawinigan Resins Corporation, 5302 Monsanto Ave., Springfield 1, Mass.

FORMVAR® *for wire enamels by* SHAWINIGAN RESINS

ANOTHER ENGINEERING ACHIEVEMENT BY **MOCO**

Now—A New Wire Enameling Machine That Produces MORE POUNDS OF FINISHED WIRE Per Hour with Commercial Grades of Varnish!



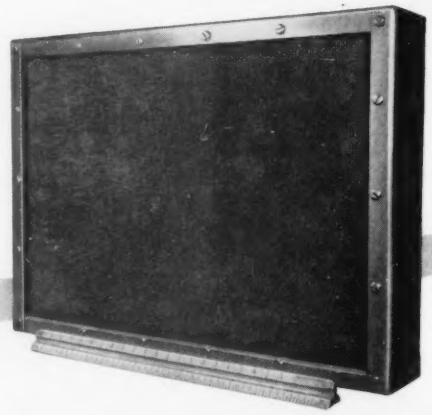
This type "B" wire machine handles wire from 31 A.W.G. to 42 A.W.G. Five other models complete the cycle—from tne finest to the heaviest wire. The unique design of the horizontal, high volumetric, recirculating double-pass oven allows greatly increased production by rapid heat impartation and a high degree of temperature uniformity throughout the wire chamber. It is seven feet long inside, with an internal recirculating fan and fume consuming catalyst. The oven can be operated by either gas or electricity.

For the first time, modern recirculating oven features—developed in recent years in the electrical manufacturing field—have been combined with the latest wire handling and coating machinery.

Here's a production capacity example: This machine consistently produces 16 heads of #33 A.W.G. with four or six coats of commercial, oleo-resinous or formvar enamels at wire speeds far in excess of 100 f.p.m.

Some of the leading wire manufacturers in the country have seen this machine in full operation in Detroit. They agree: It's a completely revolutionary development in the field of wire enameling equipment.

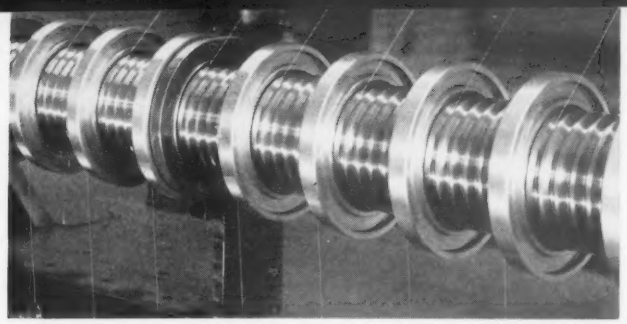
Here, in picture-caption form, is part of the story. For complete information, fill in the handy coupon on the next page.



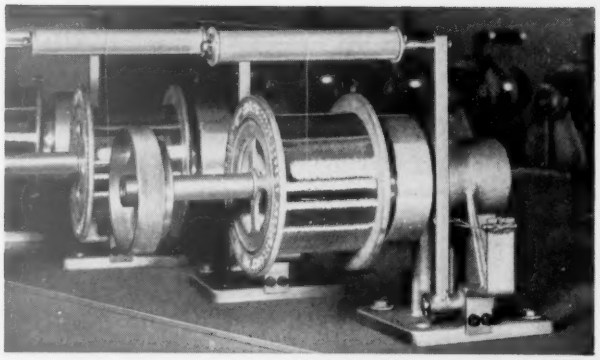
MOCO

A catalyst is installed within the recirculating stream. Solvents are consumed as they are liberated. They are transformed into usable B.T.U.'s thus reducing the amount of energy from the heat source (either gas or electricity). Results: economy, odor-free exhaust, condensate free stacks, greatly reduced fire hazard.

Photograph courtesy of Catalytic Combustion Co.

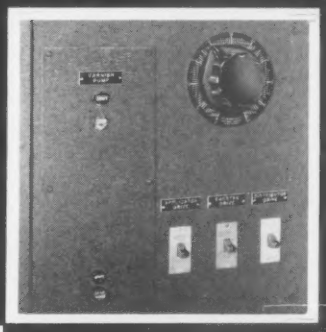


Each head of the wire capstan assembly is fitted with individual clutches at the capstan. Any or all of the lines can be started or stopped without affecting the remaining lines. Each strand is individually driven through the oven, lessening the overall tension applied to each line.



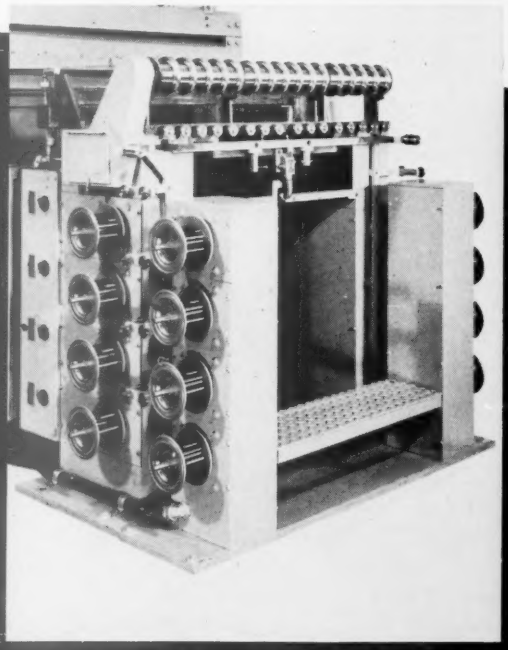
The bare wire pay-off mounts are rigidly mounted at a convenient operational height at the top of the oven. Wire tension is controlled by an automatic braking device.

The centrally located, efficient oven control panel makes operating the oven considerably easier. Experienced engineering has incorporated the ultimate in workmanship, simplicity and safety.



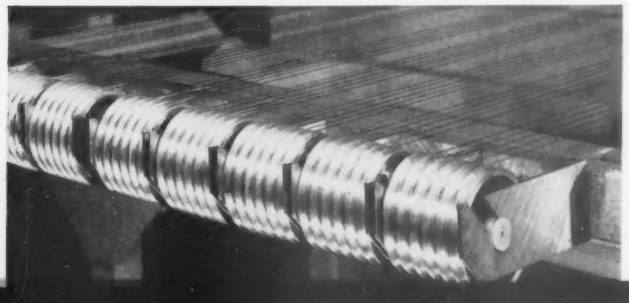
This finger-tip wire control panel brings the capstan and varnish handling equipment into a central point easily accessible to the operator.

Individual torque motor rewinds with micro-adjustment power stats. A simple arrangement of the rewind spools on the console allows easier spool changes even at the high speeds in which the unit operates.



The take-up spools on the unit console are driven by separate torque motors with individual trimmer power stats. All are controlled by a main power stat which also controls a reciprocating wire distributor with adjustable stroke length for laying uniform layers of wire on the spools.

Below: Precision-grooved sheaves with graduated depths of machined aluminum have free-turning nylon bearings.



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425 Brainard St. • Detroit 1, Michigan

MOCO

Please send complete information on the new Type "B" MOCO Wire Enameling Machine.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

How to cut your wire-handling costs

You might be surprised at how much you can trim your costs with better methods of handling steel wire. For example, we often find that when coils of wire are unloaded in customers' plants they are simply piled on the floor. This wastes valuable floor space, and clutters the aisle. And moving the wire along to the production line becomes a headache.

One customer's excellent solution to the wire-handling and storage problem is shown above. The racks, built largely from steel pipe, more than triple the storage capacity of the floor area. Coils are out of the way, yet they're easily moved by lift truck.

Another customer wanted to avoid shutting down his cold-heading machines every time a coil of wire was used up. We showed him how to set up the wire coils on two pay-off reels so that no interruptions were necessary when one coil was welded to the other.

Users of wire in large coils often have a handling problem. In working out practical handling methods for extra-heavy coils, we try to help the customer avoid the nuisance and expense of returning pallets or containers.

Because we handle so much wire in our own plants, we have developed a lot of time-saving methods which we're glad to pass along. And we're ready to do more than just offer general suggestions. If you wish, we'll provide you with drawings and specifications for such things as pipe racks, pay-off reels, and other equipment that may help you to cut your wire-handling and storage costs.

Our main job is to make top-quality steel wire to meet a wide range of requirements. But our service goes far beyond simply taking your order and shipping the wire. So don't hesitate to call our nearest sales office if you have a wire problem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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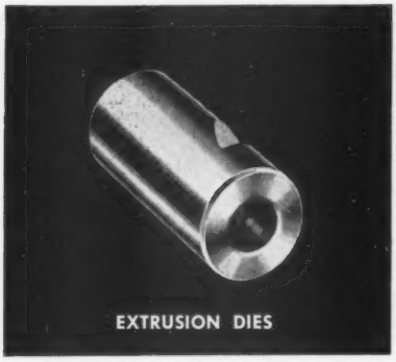
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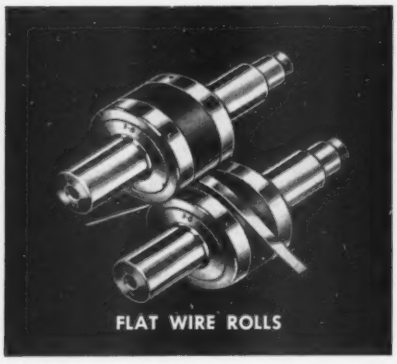
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Whether your business is drawing, flattening, extruding, or heading, there's a Carboloy product to fit your needs. And, Carboloy "bonus" services — engineering aid, local delivery, servicing facilities — will help you get maximum production from your equipment. For information, or a copy of the Carboloy Die Catalog, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Ave., Detroit 32, Michigan.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

THE BEELINE WIRE DRAWING MACHINE

Straight-line type Wire Drawing Machine for high production of all wire grades

This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (approx. .276 inch). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5
for heavy wire, about 13 mm. (.500 inch)

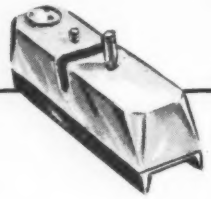
BEELINE DG 4
for wire rods, about 7 mm. (.276 inch)

BEELINE DM 3
for wire with an inlet diawire of about 3 mm. (.116 inch)

MORGÅRDSHAMMAR

MORGÅRDSHAMMARS MEK VERKSTADS AB • MORGÅRDSHAMMAR • SWEDEN

Cables: Morgårdshammar, Ludvika. Tele: 0240–71100



a short story for insulated wire manufacturers

VICTOR ELECTRIC WIRE & CABLE CORPORATION of West Warwick, Rhode Island produces the familiar SPT or Zip cord found on the cord set of almost every appliance or lamp today.

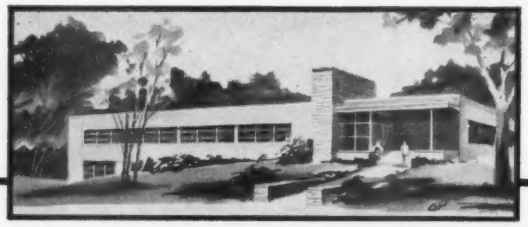
It's a highly competitive market yet they are rapidly expanding on the strength of solid customer confidence in their products. *This means quality wire at the right price.*

Part of the credit for Victor's popularity belongs to MICROLIMIT CONTROL for with this automatic control of their extruders, Victor is assured of:

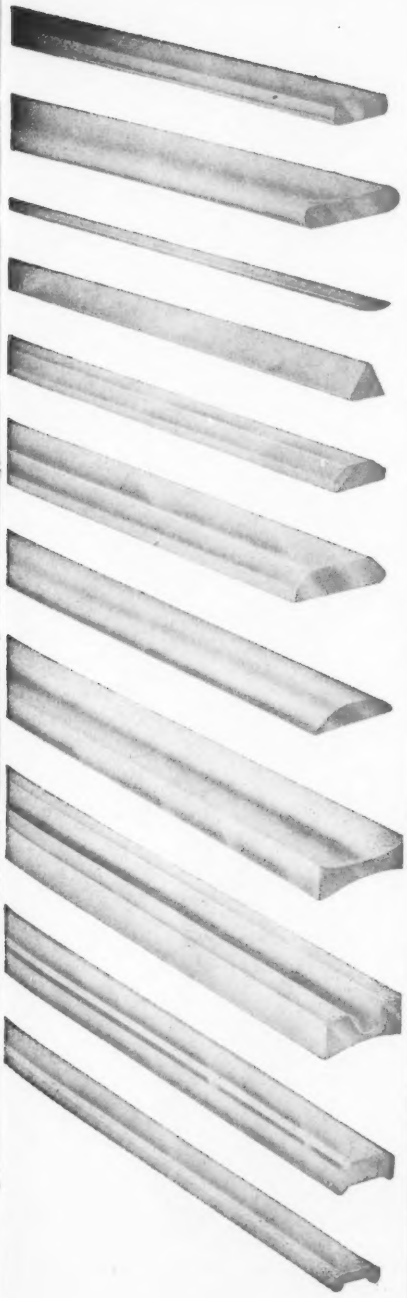
- UNIFORM WIRE DIMENSION — flash-free molded plugs and proper strain relief fitting.
- LOWER COST OF PRODUCTION — minimum waste of compound and wire.

Victor enjoys other advantages too — less tangible but nevertheless important — such as lowered production and inspection costs.

For further information —



INDUSTRIAL GAUGES CORPORATION • WEST ENGLEWOOD, NEW JERSEY



NATIONAL

WIRE

(COLD ROLLED)

in Coils or Straight Lengths

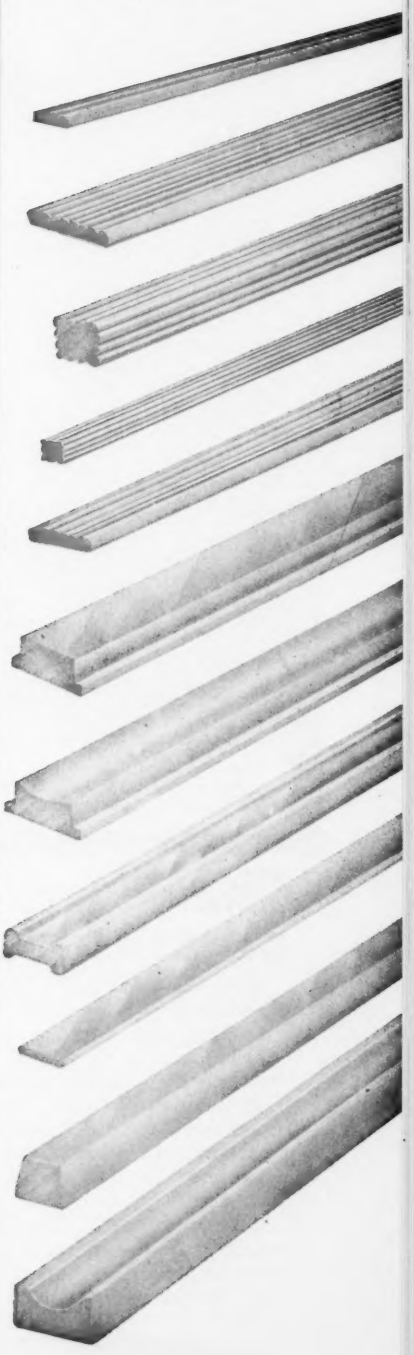
COMPLETE METALLURGICAL SERVICE

Manufacturers of

SPRING WASHERS	RETAINING RINGS
ROUND EDGE FLAT WIRE	KEYSTONE SHAPED WIRE
SQUARE EDGE FLAT WIRE	SPECIAL SHAPED WIRE

Shaped Wire in Coils or Straight Lengths, Ferrous or Non-Ferrous.

LARGE OR SMALL QUANTITIES



Manufactured by

THE NATIONAL LOCK WASHER COMPANY

PRECISION SHAPED WIRE DIVISION

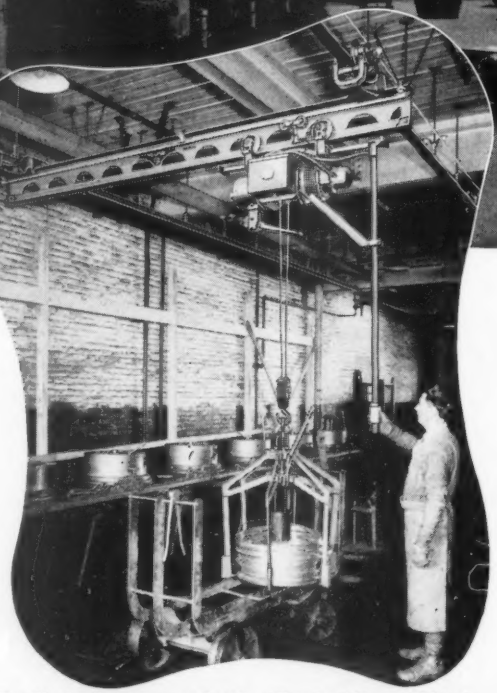
NEWARK 5, N. J. MILWAUKEE 2, WIS. U.S.A.

Modern slotted blocks are easily stripped with Cleveland Tramrail internal block-stripping equipment.

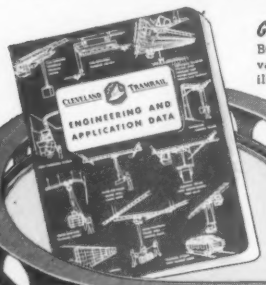
The FAST, EASY WAY OF STRIPPING BLOCKS

With an overhead Cleveland Tramrail block-stripping crane or carrier, it's a fast, easy job to remove wire from wire-drawing blocks. This equipment has been especially designed for the work by Cleveland Tramrail. The carriers are equipped with rigid arms for easy pushing of carrier and bridge. A push-button station is conveniently located in the lower end of the arm for instant operation of the electric hoist. If desired, the hoists may be mounted on a turn-table to serve blocks on two sides of an aisle.

For many years, Cleveland Tramrail has been the leading supplier of block-stripping cranes and carriers to the wire industry, for both internal and external stripping. Hundreds of such units are in operation.



For blocks that are not slotted a Cleveland Tramrail block-stripping crane with external stripper makes it a simple task to remove the wire.



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THE CLEVELAND CRANE & ENGINEERING CO.
9215 EAST 288 STREET • WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

It couldn't be done...

So they did it...in 2 blows

KEYSTONE XL WIRE STUDY

Great Lakes Screw Corporation

and KEYSTONE XL Heading Wire

"We want a door hinge bolt that won't break off in a collision—that we can drive faster—that's cheaper, yet higher in quality," said the automotive engineers.

"Can do," replied Great Lakes Screw Corporation, Chicago, Illinois.

This required an exceptional flow of material in both blows—the first blow cones the head, the second drives in the recess and mushrooms the head to specification. Tough assignment? Not with Keystone "XL" Heading Wire! Because of "XL's" consistent *flowability* and unvarying uniformity, Great Lakes makes long runs of these cold headed parts, producing them precisely on schedule with a minimum of rejects.

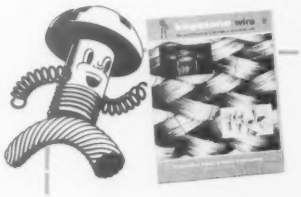
If you, like Great Lakes Screw Corporation, have difficult heading operations, we invite you to call your Keystone representative.

Our service includes close counsel and analysis of your wire requirements. Tell us how we can serve you.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE

WIRE FOR INDUSTRY



KEYSTONE STEEL & WIRE COMPANY
Peoria 7, Illinois

Mail coupon for free booklet—
COLD HEADING FACTS! Discusses methods, technical facts, wire requirements and other data.

Name_____ Title_____

Company_____

Street_____

City_____ State_____

Is your part illustrated? These are representative of the shapes that can be cold formed more effectively with Granodraw.

GRANODRAW® PROCESS INCREASES TOOL LIFE 2-5 TIMES IN COLD HEADING STEEL FASTENERS

Thorough research, in cooperation with a leading manufacturer of headed fasteners, has proved the value of Granodraw phosphate coating of stock prior to cold working. Typical of the improvement in tool life and in production are the examples shown in the table.

But the advantages do not stop here in cold heading fasteners or cold working other products. This chemical treatment process permits greater speed of draw; greater reductions within the physical limits of the metal; more passes with the same number of intermediate treatments; and the possibility of fewer process anneals. It also results in less downtime of machines, better surface finish on products, cold forming of more complex shapes, fewer rejects, and a cleaner shop.

Write us for complete information about Granodraw and its application in cold forming operations.

PRODUCTION AND TOOL LIFE

PRODUCT	MATERIAL		AV. PIECES PER DIE DRESSING	
	Tool	Stock	Granodraw-Treated	Other Treatment
⅜ x ⅞ rivet	Hardened Alloy Steel	1010 Steel	647,000	180,500
5/16 x 24 flat head shoulder bolt	Hardened Alloy Steel	1010 Steel	26,000	5000-8000
Hex Head Cap Screws	Hardened Alloy Steel	1038 Steel	53,000	13,000-14,000
¼ x 20 Hex Machine Bolt	Hardened Alloy Steel	1018 Steel	28,000	13,000

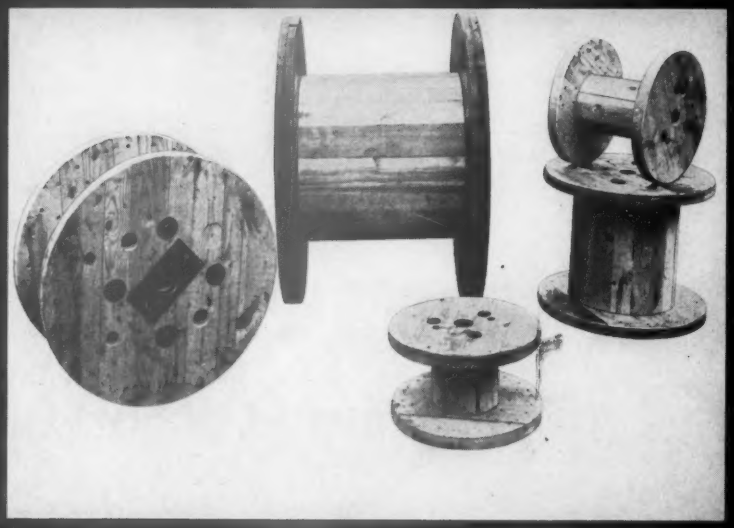
Note. Although investigations on the life of carbide tools are not completed, one item deserves mention. A 5/16 x 24 hex head shoulder bolt showed a strikingly low carbide tool life of 67,000 pieces per die. Using Granodraw-treated rod, one die produced 105,000 pieces—another 194,000 pieces. And both dies were in good condition at the end of the run.

AMERICAN CHEMICAL PAINT COMPANY, Ambler 30, Pa.

DETROIT, MICHIGAN ST. JOSEPH, MISSOURI NILES, CALIFORNIA WINDSOR, ONTARIO

CHEMICALS ACP PROCESSES

use
NON-RETURNABLE
wood
reels
for
all
sizes
and
types
of
electric
wire
and
cable



SHIP the modern way!

LOOK! at the ADVANTAGES

- REDUCED REEL INVESTMENT
- LESS STORAGE SPACE REQ'D.
- LOWER FREIGHT COSTS
- NO BOOKKEEPING
- NO REPAIR COSTS
- NO CASH DEPOSITS REQ'D.
- NO RETURN FREIGHT COSTS
- NO MORE HEADACHES!!!

NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST

HIGH SPEED
SHIPPING SERVICE
in our . . .
OWN TRUCKS
within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels in 5 days or less east of the Mississippi.

BRIDGE
MANUFACTURING
COMPANY
HAZARDVILLE, CONNECTICUT
Telephone . . .
Thompsonville, Connecticut
Riverview 9-8308

"REEL GOOD . . .
Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.
WOOD REELS"

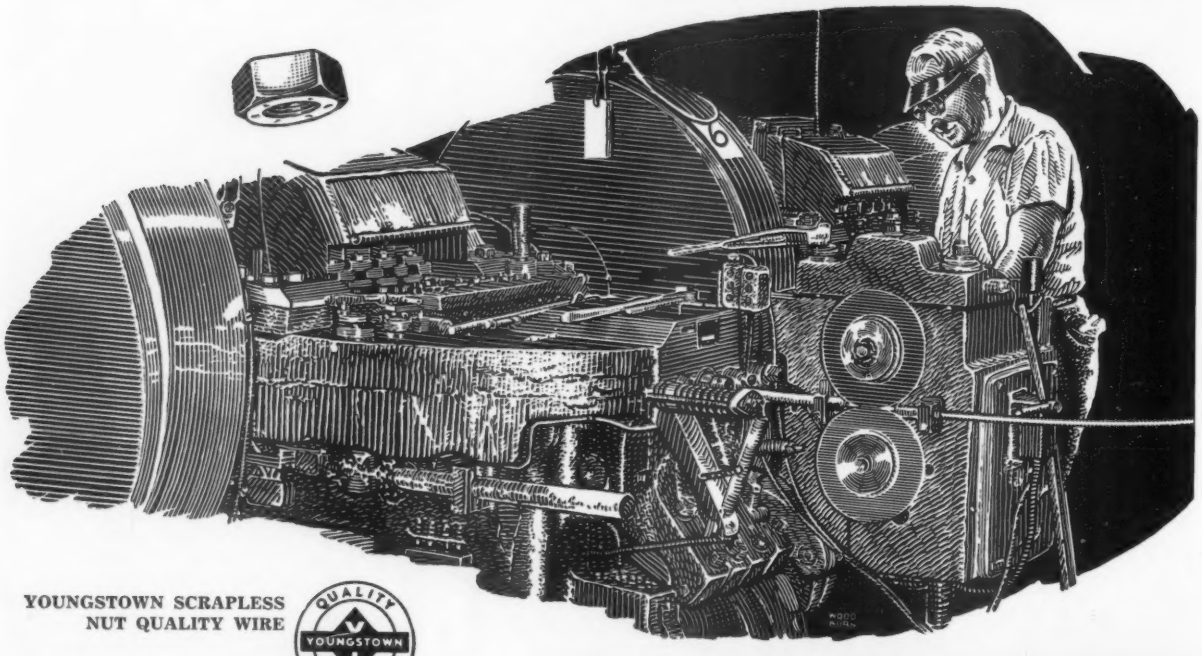
For over 50 years, leading manufacturers in all the major industries have used Gripco lock nuts to simplify production, lower manufacturing and maintenance costs and to improve the durability of all kinds of assembled products. To maintain this enviable reputation for outstanding product quality, the Grip Nut Company of South Whitley, Indiana, uses quality-controlled Youngstown Scrapless Nut Wire and Bars as basic raw material.

Because it comes to your plant free from all piping, injurious seams, laps, die marks, internal tearing and cupping, and non-metallic inclusions —Youngstown Scrapless Nut Quality Wire will provide increased production with fewer rejects which adds up to a healthy over-all profit boost. Also, its smooth coating extends die life thus minimizing costly die replacements.

YOUNGSTOWN SCRAPLESS NUT WIRE

Helps Maintain Quality of GRIP *Lock Nuts*

Youngstown Scrapless Nut Quality Wire is provided in special resulphurized steels as well as in standard AISI grades. Cold Heading Bolt Wire, of the same high Youngstown quality, is also available in all standard carbon and alloy analyses. Why not phone or write to our nearest District Sales Office for additional information or metallurgical assistance?



YOUNGSTOWN SCRAPLESS NUT QUALITY WIRE

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

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Du Pont ZYTEL® nylon resins have unusual advantages as jacketing materials

ZYTEL nylon resins have remarkable physical characteristics which enable them to withstand the most rugged operating conditions. Because of its outstanding abrasion resistance, for example, ZYTEL is used for infantry field wire. Its toughness, strength and weather resistance have been proven under the toughest combat conditions.

Another important property of ZYTEL is its heat resistance. Rated for use at temperatures up to 250°F., ZYTEL is used extensively on resistance wire for radiant space heating systems, electric blanket wire and automotive ignition wiring. ZYTEL has good flexibility at temperatures even below –60°F.

ZYTEL is also chemically resistant. Thus in aircraft applications, it provides maximum protection against the attack of high-octane gasoline, oils, and hydraulic fluids.

In addition, ZYTEL nylon resins are easily extruded over metallic wire and coating materials such as polyethylene and PVC. The lightness in weight and low coefficient of friction of ZYTEL permit quicker and easier installation.

ZYTEL nylon resins offer an extensive choice of properties . . . suitable to a wide range of insulating and jacketing requirements. Most likely there is a formulation of ZYTEL tailored to fit your specific needs. Check the application list at the right; it will give you some idea of the expanding use of this versatile material.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . THROUGH CHEMISTRY

TYPICAL APPLICATIONS OF ZYTEL® NYLON RESINS

• Control Cable • Radiant Heating Wire • Radio and TV Hook-Up Wire • Infantry Field Wire (WD-1) • Wire Rope • Gas Station Wire • Electric Blanket Wire • Blasting Cap Wire • Textile Braid Coverings • Refrigerator Defroster Wire • Equipment Hook-Up Wire [MIL-W-16878 B (Navy)] • Geophysical Cable • Navy "TTR" Cable • Hook-Up Wire [MIL-W-76A (Armed Forces)] • Thermocouple Wire • Magnet Wire • General Appliance and Hook-Up Wires • Tree Wire • Power Cable Jackets • Navy Tow Cable (MIL-C-15452-B) • Building Wire • Telephone Wire • Automotive Ignition Wire • Aircraft Wire [MIL-W-5274 A (USAF)] • Aircraft Wire [MIL-W-5086 (Navy, USAF)]

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept. Room 522, Du Pont Building, Wilmington 98, Delaware

Please send me more information on Du Pont ZYTEL. I am interested in evaluating this material for_____

*Name*_____

*Firm Name*_____

*Position*_____

*Type of Business*_____

*Street Address*_____

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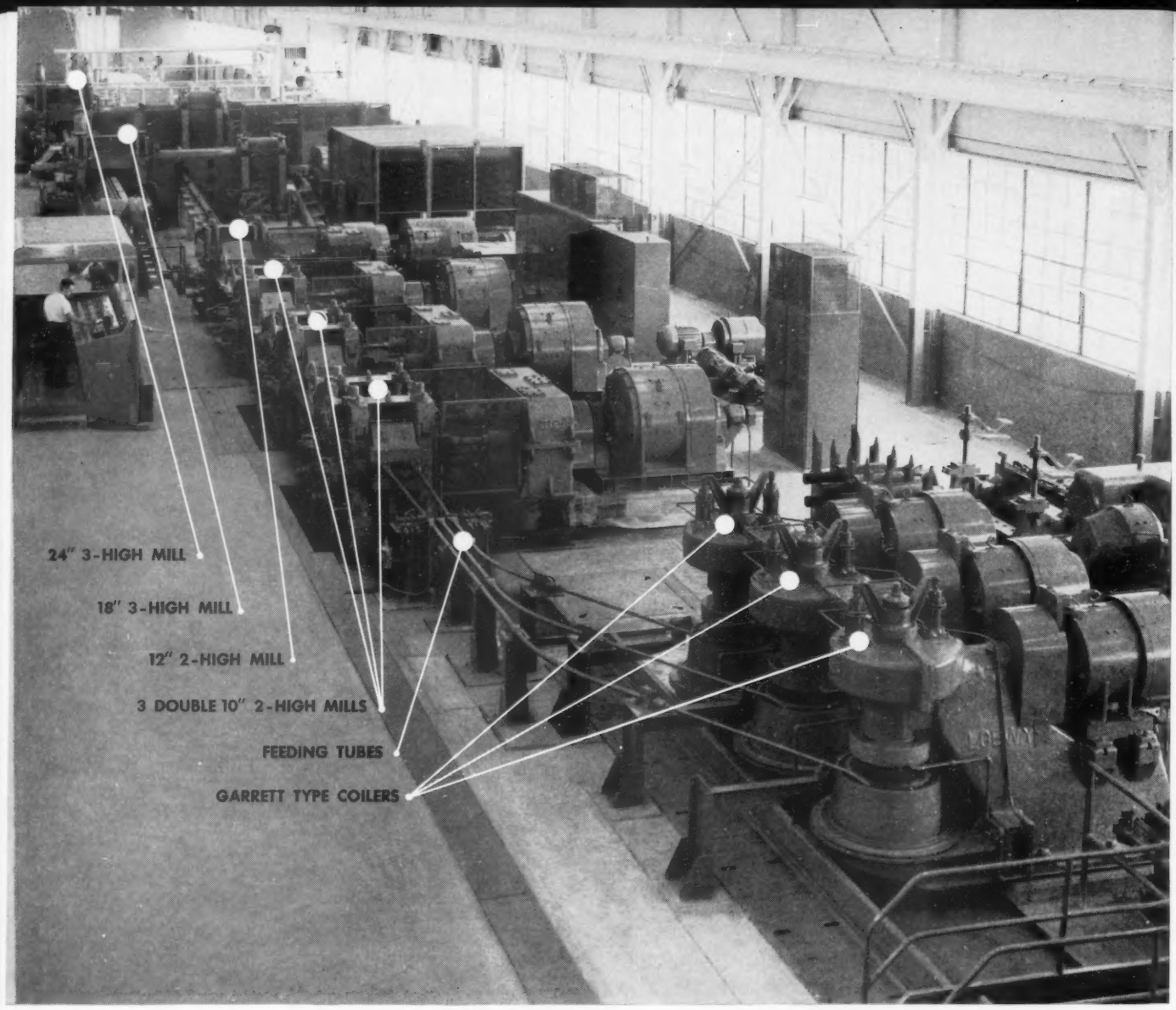
In Canada: Du Pont Company of Canada (1956) Limited, P. O. Box 660, Montreal.



This installation has a capacity of 40,000 lbs per hour for 2-strand rolling with finished coil delivery every 19 seconds.

new Loewy copper wire rod mill reduces wire bars to 5/16" wire rod, automatically

At the plant of a leading manufacturer of electric cable, this new Loewy mill is rolling 5/16" and 7/16" copper wire rod from standard wire bars in a continuous, fully automatic operation.

The mill consists of two 3-high roughing mill stands, seven continuous finishing stands and three Garrett coilers. Copper wire bars are conveyor-fed into the furnace. After leaving the furnace the ingots are rolled down in 14 passes to finished size. Leaving the last stand at a speed of 2400 FPM the wire is coiled. The coils are tied and conveyed into a pickling line. The entire procedure is automatic and all operations are controlled from one operator pulpit.

Like this high-speed wire rod mill, all Loewy equipment is designed to produce more, in less time, at lowest cost. We design, build and install blooming and slabbing mills, plate mills, structural and rail mills, bar and skelp mills, continuous billet and strip mills for ferrous and non-ferrous metals as well as high-speed foil mills. For illustrated bulletin 14002, write Dept. 170, Loewy-Hydropress Division, BLH Corporation, 111 Fifth Avenue, New York 3, N.Y.

BALDWIN BLH LIMA-HAMILTON

LOEWY-HYDROPRESS
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Eddystone • Hamilton • Electronics & Instrumentation • Lima • Madsen • Loewy-Hydropress • Pelton • Standard Steel Works

Want to streamline your wire buying?

Call American Steel & Wire!

Have you been bogged down with paper work lately, thereby missing a chance to save money by streamlining your wire buying?

Your American Steel & Wire representative can be of immense help if you give him a call. For example, he may be able to suggest more economical buying units or packaging specifications, or find one type of wire that will do the job of two. Turn him loose in the plant, because he might find a lower cost way of doing the job —with a better product the result.

At AS&W, we *use* a lot of wire in our own plants, and have learned many little tricks that are yours for the asking. Just call your American Steel & Wire representative.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN MANUFACTURERS WIRE

USS

AMERFINE —*high quality fine wire.*
AMERSPRING —*music steel spring wire.*
AMERTEMP —*heavy-duty oil-tempered wire.*
AMERLOY —*alloy heading wire.*
AMERHEAD —*uniform heading wire.*
AMERSTITCH —*extra-tough metal stitching wire.*

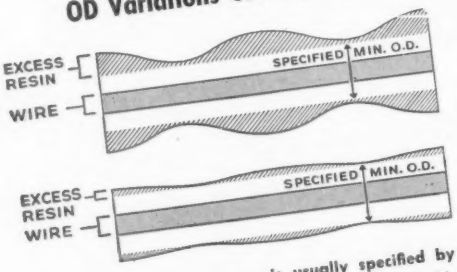
UNITED STATES STEEL

U.S.I. POLYETHYLENE PROCESSING TIPS

Choose the Right Resin For Polyethylene Wire Coating

Now that polyethylene is being widely accepted as an insulating material for wire and cable, insulated wire manufacturers and plastics producers are working closely together to provide the best insulations at the lowest possible cost. Although the only true test of a given polyethylene resin is a test run followed by a thorough evaluation of the finished wire, there are certain principles that can be used beforehand as guides. For example:

OD Variations Cost Money



Minimum Outside Diameter is usually specified by the wire customer. But a variation in OD above this minimum uses extra quantities of polyethylene resin — and cuts into extruder profits. These variations can be reduced by using resins with consistant flow characteristics as shown in the lower sketch.

Higher Production Rate Means Higher Profit

The faster a machine can be operated, the more money it can make. But higher rates require tighter controls — especially tighter control of resin properties. A resin variation that might still give a satisfactory product at moderate production rates may not be acceptable when the extruding rate is pushed to its limit. Again, consistency of resin properties is of extreme importance.

Final Properties Are All-Important

Deformation under load, stress-cracking, low-temperature brittleness and spark failure must be kept to a minimum in an acceptable wire and cable insulation. Any resin used, no matter what its processing characteristics, must pass these tests.

Why We Recommend PETROTHENE®

Because we make it — of course. But more than that, PETROTHENE does a good job for wire and cable extruders because our manufacturing process does achieve the high consistency processors are looking for. Shipment-to-shipment, bag-to-bag, and cube-to-cube, variations are held to a minimum. This high consistency enables insulated wire manufacturers to operate at highest rates with minimum OD variation when using PETROTHENE electrical grade polyethylene resins.

PETROTHENE resin properties also measure up to end-use standards for deformation under load, stress-crack resistance, low-temperature brittleness and spark failure.

Three Basic Resins Are Available

PETROTHENE 300, M.I. = 0.3; PETROTHENE 301, M.I. = 1.0; PETROTHENE 302, M.I. = 2.8. Each available with carbon black, color, JZF antioxidant, and/or non-discoloring antioxidant, compounded to your specifications.

U.S.I. Services

Literature and samples of PETROTHENE electrical grade polyethylene resins are available at your request. U.S.I. Technical Service representatives are also ready to help you with individual processing problems.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers Products Corporation
99 Park Avenue, New York 16, N. Y.
Branches in principal cities

WATERBURY FARREL
FOUNDED 1851

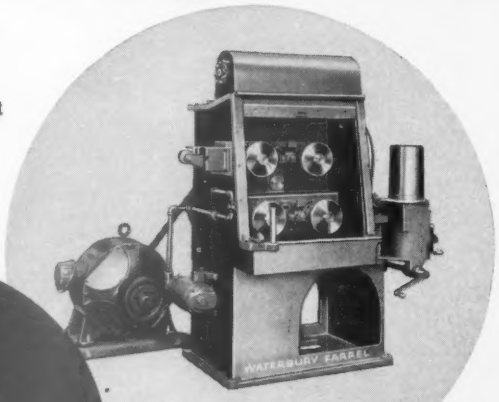
Custom-Engineered Upright Cone *Wire Drawing Machines*

★ **In 4 Sizes**

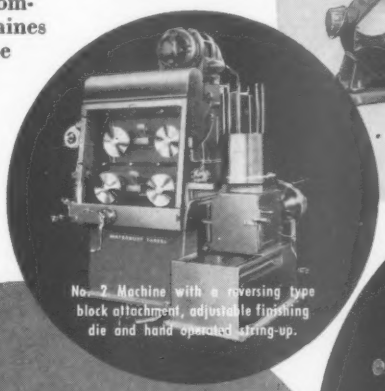
★ **With Drive, String-Up and Packaging Equipment To Fit *Your* Specific Requirements**

★ **And Precision, Quality Construction Throughout**

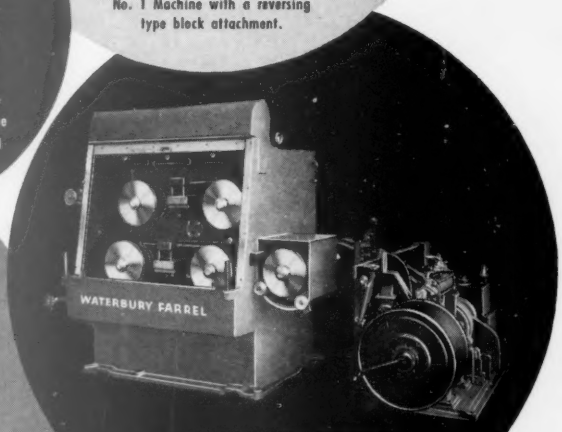
Here are four examples of Waterbury Farrel's long-proven ability to custom-engineer wire drawing machines for specific applications. The machine *you* need may call for another variation in design. For further information on the size and type of upright cone machine fitted to *your* exact requirements, contact Waterbury Farrel, today.



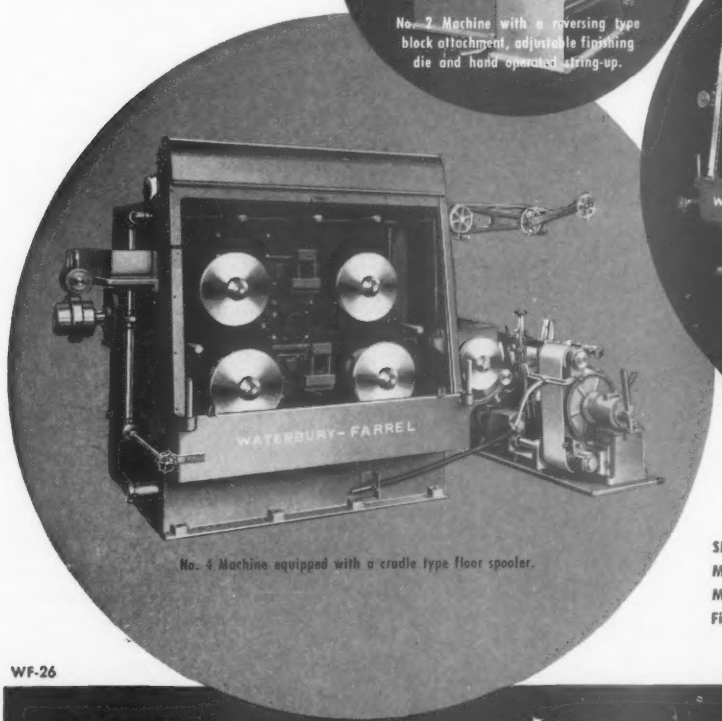
No. 1 Machine with a reversing type block attachment.



No. 2 Machine with a reversing type block attachment, adjustable finishing die and hand operated string-up.



No. 3 Machine with a floor spooler.



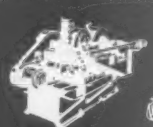
No. 4 Machine equipped with a cradle type floor spooler.

SPECIFICATIONS

Size of Machine	No. 1	No. 2	No. 3	No. 4
Max. No. of Dies	16	14	12	13
Max. Starting Size B & S	#14	#8	#4	¼
Finishing Sizes, B & S	#26 to #42	#20 to #34	#14 to #26	#12 to #18

WF-26

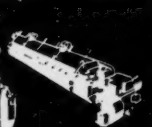
WATERBURY FARREL
FOUNDRY & MACHINE CO.
Waterbury, Conn. U. S. A.
Sales Offices: Chicago • Cleveland • Millburn, N. J.

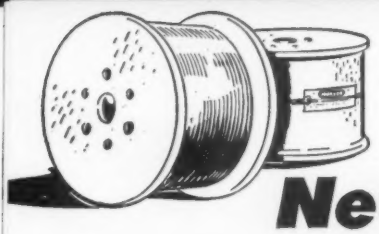

Bolt, Nut & Screw Machinery

Power Presses

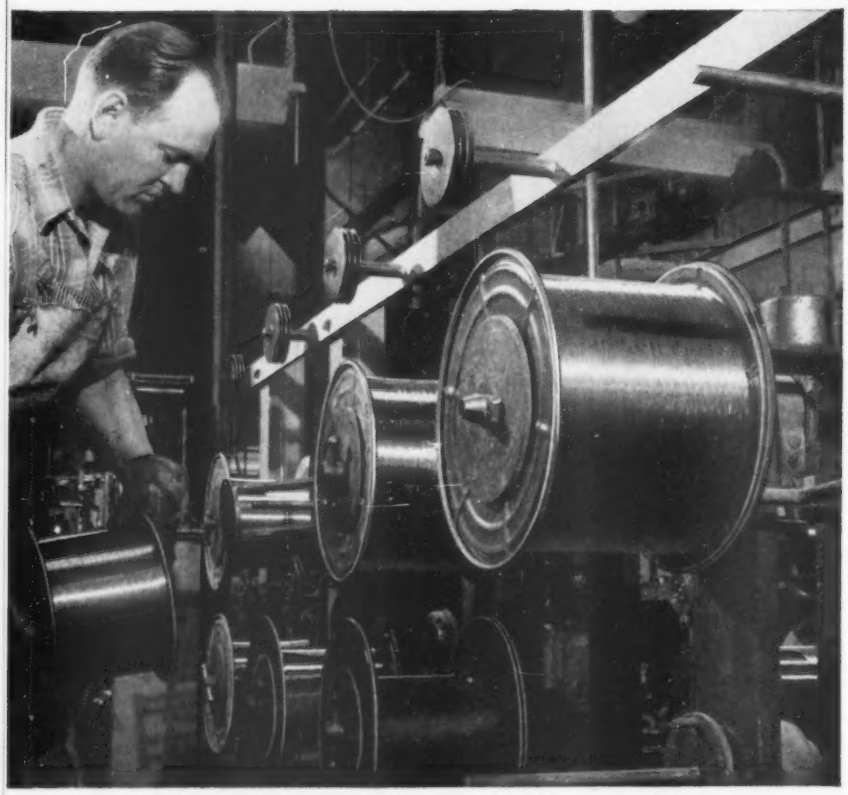
Rolling Mill Machinery

Sendzimir Mills & Other Special Machinery


Wire Mill Equipment



New Discard-a-Spool
Reduces Thermoid's Wire Rewind Loss to ½ of 1%



Light-weight Discard-a-Spool fits easily and quickly on let-off equipment.

Discard-a-Spool cut wire losses in rewinding to less than ½ of 1 per cent.

Johnson Steel's New One-Way Spool Weighs 28 Ounces vs. 200 Ounces

In a mountain-lined valley in Utah, a year-long test of an improved method of packaging fine wire has been stamped "a complete success."

Thermoid Western Division, Thermoid Company, Trenton, N. J., one of the nation's top manufacturers of wire-reinforced rubber hose, has given full approval to Johnson Steel & Wire Co.'s new Discard-a-Spool.

Light-weight, non-returnable Discard-a-Spool underwent testing in actual production at Thermoid's plant for many months. The result: now Thermoid specifies that all hose wire be delivered on new Discard-a-Spools.

Discard-a-Spool offers you these advantages over competitive packaging methods, whether made of metal or tempered Masonite:

- **It weighs only 28 ounces** and slashes tare weight by 14 times.
- **Fully protects the high quality** hose wire from contaminants and in-shipment damages. Overlaps and tangles are eliminated, the wire's critical surface finish is guarded.
- **Shrinks Thermoid's wire losses** in re-winding to less than ½ of 1 per cent.

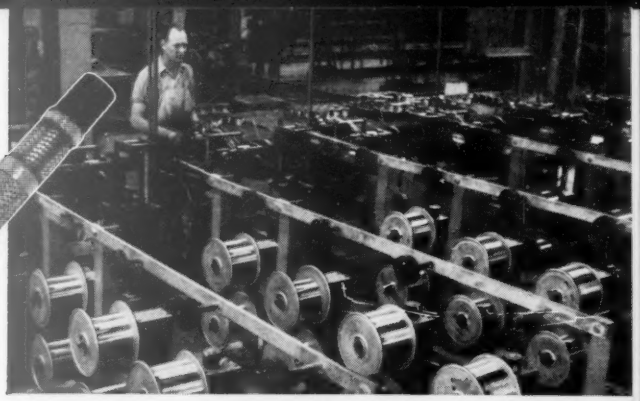
Through substitution of Discard-a-Spool for the heavier, must-be-returned steel spool formerly used, Thermoid computes substantial savings.

A typical package of the new wire consists of 36 Discard-a-Spools in a sturdy, two-layer cardboard box. The box is steel-strapped to a wooden pallet for easy handling by fork-lifts. The entire package weighs approximately 2,385 pounds gross, or 2,250 pounds net, producing a tare weight of 135 pounds.

Using outmoded, heavy spools, which weighed about 12½ pounds and had to be returned to the wire mill, tare weight was 1,023 pounds for the same quantity of wire.

- **Major Supplier**—In the past 21 years, Johnson Steel & Wire has become one of Thermoid's major suppliers of hose wire for a wide variety

Johnson's high-quality hose reinforcement wire is fabricated into braids which form plies of strength around rubber tubing. As many as four braids can be plaited into reinforced rubber hose. At right, cut-away section shows plies of wire separating layers of rubber.



Johnson Steel is a major supplier of the high quality hose reinforcing wire Thermoid Western uses at its Nephi, Utah, plant. For 18 months, Thermoid cooperated with Johnson Steel & Wire Co. in extensive production tests of the new Discard-a-Spool.

of high-strength rubber hoses.

At Nephi, Utah, Thermoid's hose wire braiding machines convert Johnson's wire into plaited sheaths around rubber tubing. The number of braids in a hose is determined by the end use of the hose. Thermoid builds dozens of different types of wire braided hose, ranging from 3/16th inch to 4 inches in diameter. They vary from hose with a single ply, or layer, of plaited steel wire to 4 plies of practically unbreakable wire plaiting.

In a standard 50-foot length of four-ply, 2½ inch hose, 38.5 miles of Johnson wire is used, fitting it for tough hydraulic pressure jobs like core, water and oil well drilling and sand busting in the oil fields.

Without steel reinforcing, rubber hose has a bursting resistance of only about 50 p.s.i. In the case of half-inch reinforced hose, the first ply of braid raises bursting strength from 50 p.s.i. to 10,000 p.s.i. A second layer increases it to 16,000 p.s.i. These are minimum figures, since Thermoid actually builds its hoses so that breaking points are four times maximum working pressures on the hose.

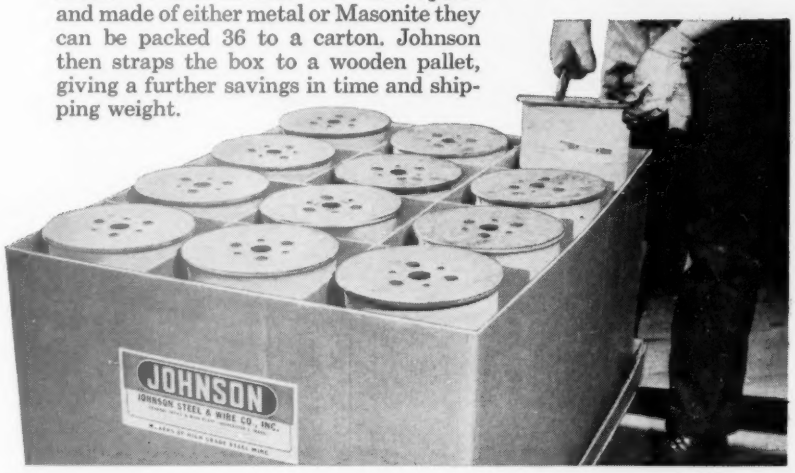
According to J. A. Muller, Thermoid's Director of Research and Development, the secret of building good hose rests on a number of factors. Among them is steel wire of high quality.

Thermoid selects Johnson wire because its structure meets or exceeds specifications. The wire surface is free of nicks which could cause premature fatigue stress or breakage during braiding operations.

• **Cleanliness Vital**—Good adhesion also requires a wire with a clean surface. To get superior adhesion Thermoid uses a dry assembly process for hose components.

These advantages of Johnson's wire are not the only benefits Thermoid gains. Johnson's products stay within the specified tensile ranges.

Discard-a-Spools are lighter and easier to handle than returnable hose wire spools and made of either metal or Masonite they can be packed 36 to a carton. Johnson then straps the box to a wooden pallet, giving a further savings in time and shipping weight.



Variations in tensile can cause serious trouble in the braiding operations.

"Any deficiency in the wire shows up in winding or during the braiding operation itself," Mr. Muller explains.

It takes up to eight hours to set up the 120 bobbins on the big braider. One bad wire is enough to jam the machine and the cost to get it set up again is figured at $245—$35 for labor and $210 for damaged and lost wire. The time lost adds still more expense.

The Utah plant, far from the nation's wire producing mills, requires tops in quality and service.

Thermoid's experience with Johnson Steel & Wire Co. demonstrates why you should let Johnson handle your fine wire supply problems.

Johnson's full range of specialty wires and its progressiveness are your guarantee of satisfaction. Let a Johnson specialist explain how top quality wire or the latest packaging improvement—like the new Discard-a-Spool—can eliminate your worries. The Johnson man is experienced and willing. He's as close as your telephone. Give him a call today.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

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With

NOPCO® KLY

a liquid fine wire drawing lubricant

Be sure to try Nopco KLY next time you're drawing fine size steel or fine and intermediate size copper wire. It's *different*—and everything different about it you'll find is a big advantage.

First, this emulsifiable oil mixes quickly and completely with water—hot or cold. This feature alone is enough to make it ace-high with you. But it has other advantages equally important.

Your bath lasts longer. Nopco KLY has a built-in affinity for water. Its lubricants stay *uniformly active* much longer, since the "drag out" of the lubricants from the solution is reduced beyond anything you've ever seen.

Prevents Formation of Insoluble Copper and Lime Soaps—both the copper soaps, which score dies, clog feed lines and screens; and the lime soaps you've been bothered with when drawing lime coated steel wire.

KLY may be used for high carbon, low carbon, limed, galvanized, and liquor finished fine steel wire—also for fine and intermediate copper, bronze, and brass wire.

You'll surely want to try this die-saving, cost-saving lubricant soon. Write today for free booklet "Nopco KLY", which gives full instructions, lists percentages of fat in all emulsions.

Nopco Chemical Company,
Harrison, N. J.

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YOU MIX IT FASTER, EASIER

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PLANTS: Harrison, N. J.
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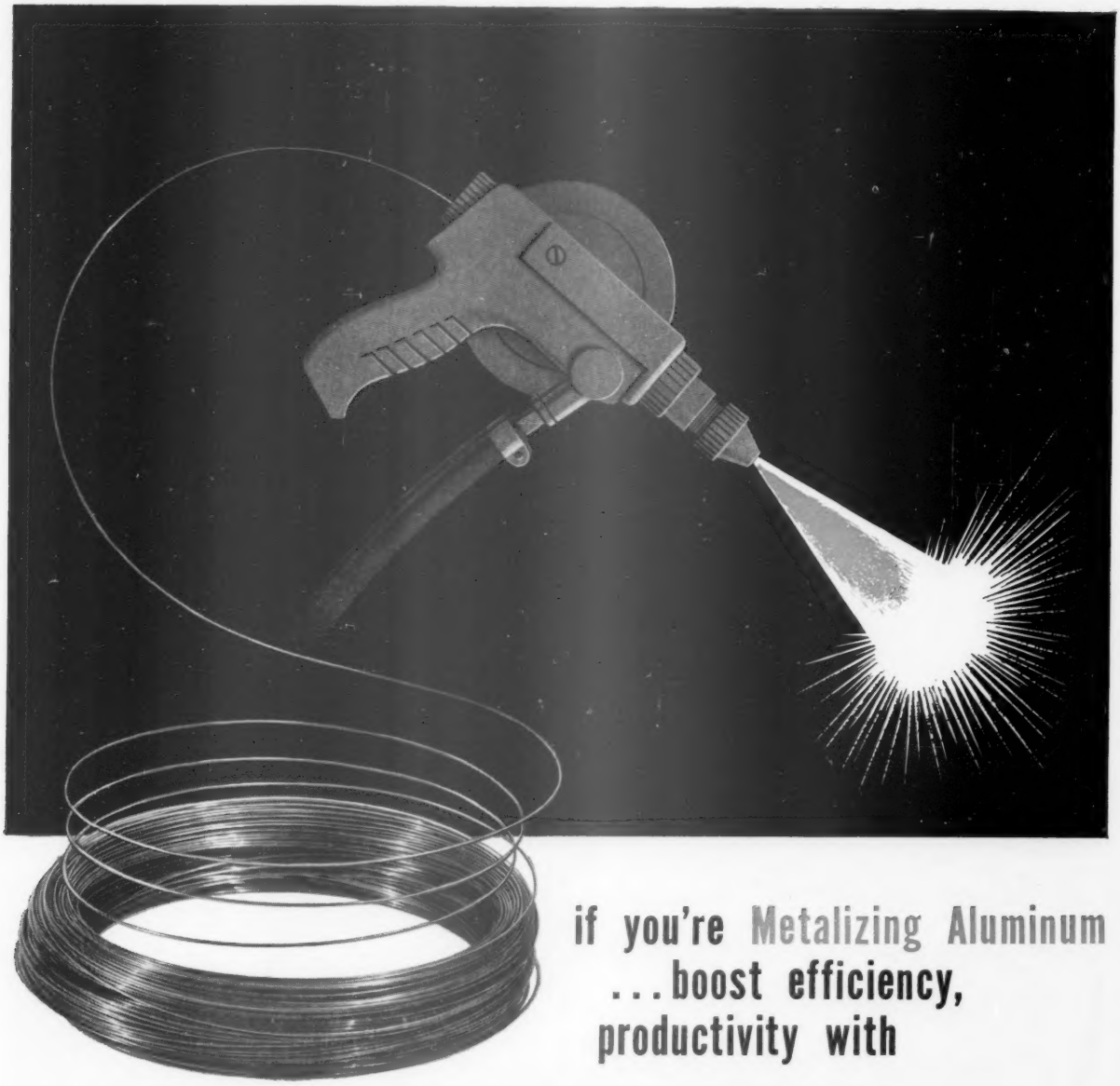

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UNITED ALUMINUM WIRE

With the right materials, metalizing or spray wire can be a tremendously successful production and maintenance operation. When metalizing aluminum, for example, efficiency and productivity go way up when gun feeds rich, pure United Aluminum Wire.

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Common sizes, $\frac{1}{8}$" and $\frac{3}{16}$", are shipped promptly. Other sizes also available. Same high quality is also available in copper and copper alloys.

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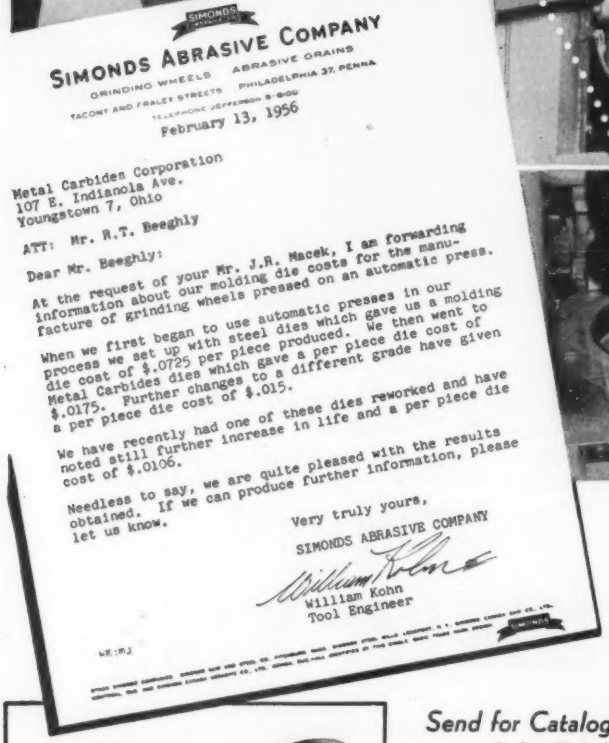
Talide Die

cuts molding cost

7¼¢ to 1¢...

● Simonds Abrasive Company, a leading producer of abrasive wheels, called in a Talide Die Engineer to help reduce excessive die costs. The highly abrasive action experienced in molding the wheels to shape cut service life of hardened steel dies to 3000 wheels. A Talide carbide die having 6" I.D. was designed and, due to its super hard and dense structure, approximately 25 times the number of wheels were pressed! $4,708.80 worth of steel dies would have been required to equal the production of this one $690.00 Talide die. **Metal Carbides Corporation, 6001 Southern Boulevard, Youngstown 12, Ohio.**



SIMONDS ABRASIVE COMPANY

GRINDING WHEELS ABRASIVE GRAINS

TACONY AND FRALEY STREETS PHILADELPHIA 37, PENNA.

TELEPHONE JEFFERSON 8-8100

February 13, 1956

Metal Carbides Corporation
107 E. Indianola Ave.
Youngstown 7, Ohio

ATT: Mr. R.T. Beeghly

Dear Mr. Beeghly:

At the request of your Mr. J.R. Macek, I am forwarding information about our molding die costs for the manufacture of grinding wheels pressed on an automatic press.

When we first began to use automatic presses in our process we set up with steel dies which gave us a molding die cost of $.0725 per piece produced. We then went to Metal Carbides dies which gave a per piece die cost of $.0175. Further changes to a different grade have given a per piece die cost of $.015.

We have recently had one of these dies reworked and have noted still further increase in life and a per piece die cost of $.0106.

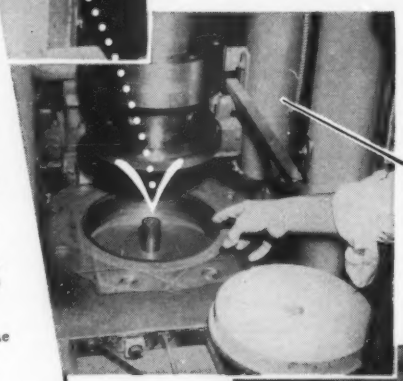
Needless to say, we are quite pleased with the results obtained. If we can produce further information, please let us know.

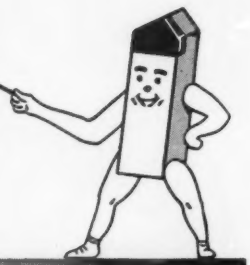
Very truly yours,

SIMONDS ABRASIVE COMPANY

William Kohn
Tool Engineer

WK:MJ





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Compacting highly abrasive chemical powders, TALIDE Pill dies last 4 months, steel dies wore out in 6 hours.

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Cold-heading ¼" C-1008 steel rivets, TALIDE dies produced 11,200,000 pieces, other carbide dies only 3,500,000.

Send for Catalog 56-G or ask for Talide Die Engineer to call

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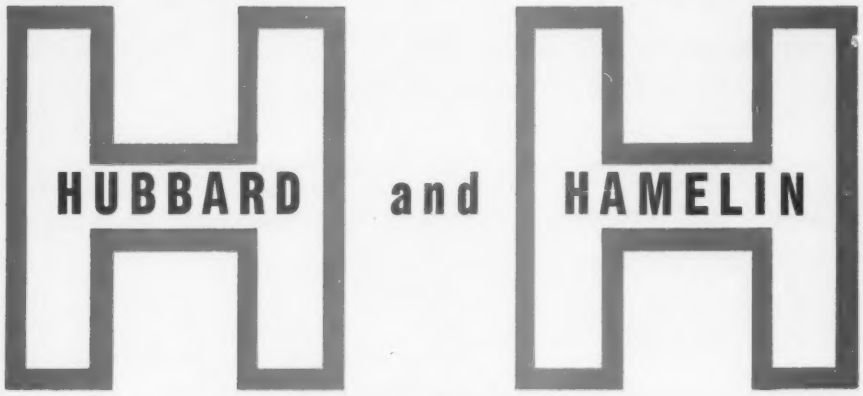

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Lachine, Que., Canada

The Hubbard Spool Co. and the Hamelin Lumber and Woodwork Ltd. have formed the above company in Canada for the purpose of manufacturing a more complete line of spools, reels and related items for the wire and cable industry in Canada and to give better and quicker service, resulting in cost savings to our customers.

The H & H Organization Consists of:

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R. M. STOUT—*Vice Pres.-Sales Mgr.*

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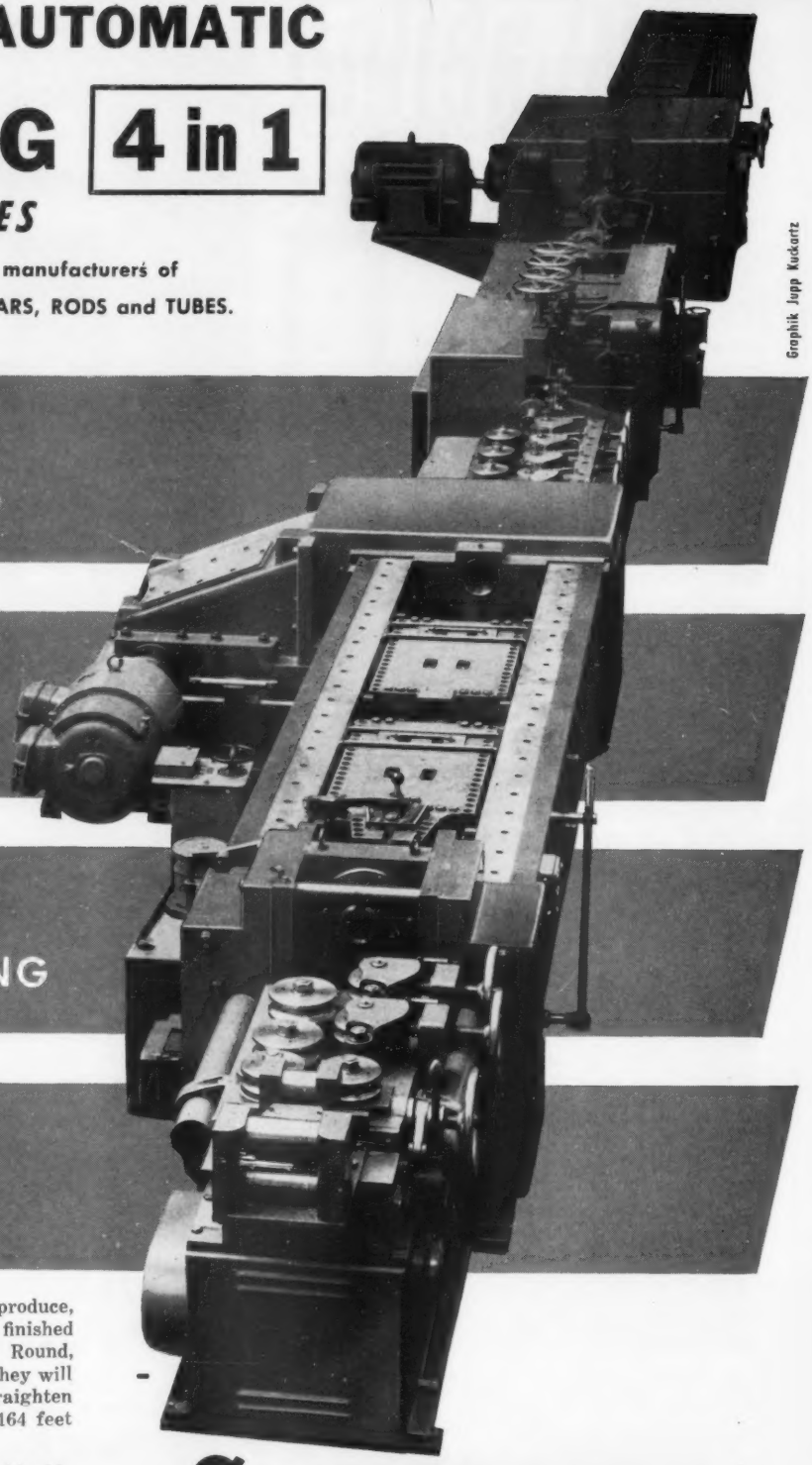

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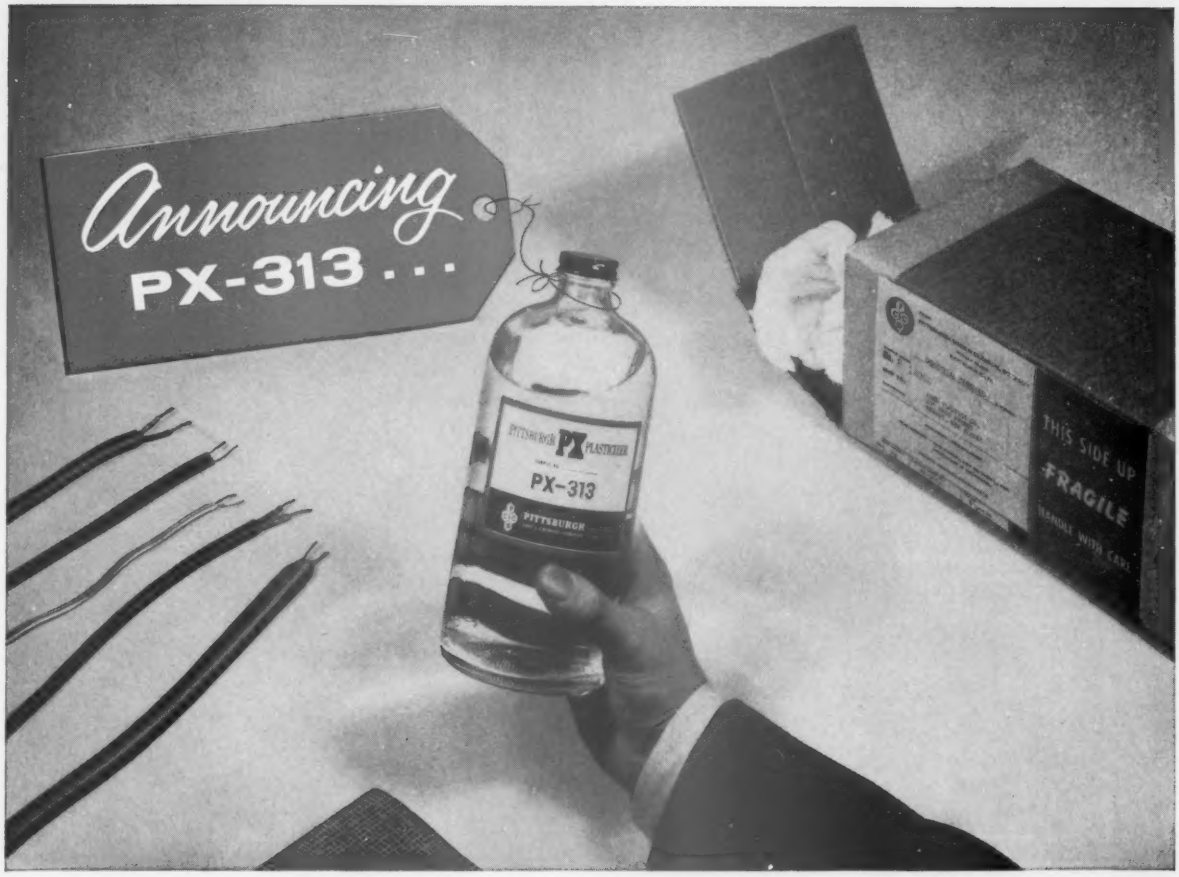

. . . Pittsburgh's New Cost-Saving Low Temperature Low Volatile Phthalate Plasticizer

HERE is a completely new Pittsburgh Plasticizer that may enable you to realize important cost reductions if your production requires a primary plasticizer with excellent low temperature flexibility, low volatility and good processing characteristics.

A modified alkyl phthalate, PX-313 imparts a low temperature flexibility in vinyls equivalent to that obtained with normal octyl-normal decyl phthalates, but at appreciably lower plasticizer cost.

PX-313 is ideal for vinyl-jacketed wire and other extruded products where elevated processing temperatures are encountered. Its good low volatility characteristics at elevated temperatures, combined with its ability to provide good flexibility at low temperatures, makes PX-313 especially suitable for jacketing applications where extremes of "in service" temperature requirements are often encountered.

If the economics of this newly developed Pittsburgh Plasticizer seem to offer potential advantages in your operations, we invite you to send for a sample and further data today.

PITTSBURGH *Job-Rated* PLASTICIZERS

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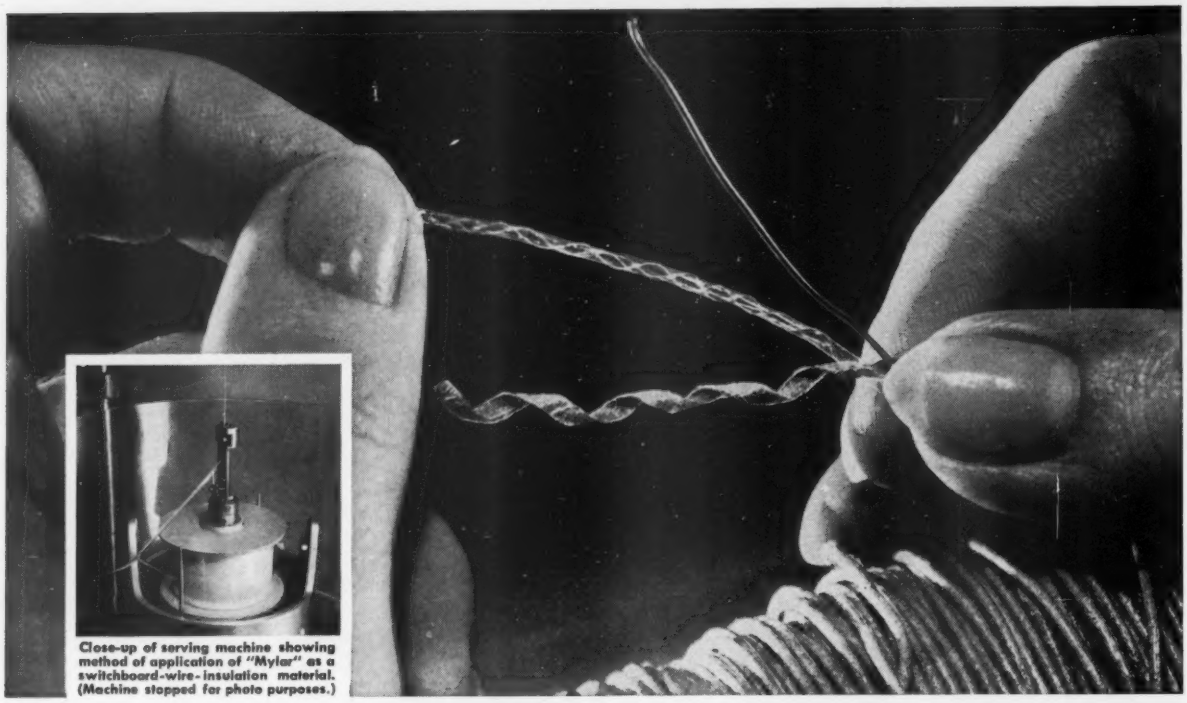
Stromberg-Carlson uses new Du Pont MYLAR* to increase switchboard-wire production rate 46%



Close-up of serving machine showing method of application of "Mylar" as a switchboard-wire-insulation material. (Machine stopped for photo purposes.)

Tough, durable "Mylar" makes possible improved insulation

Here's another example of the outstanding improvements now possible with Du Pont "Mylar" polyester film—switchboard wire made by Stromberg-Carlson. The company reports that "Mylar", one-half the thickness but twice the tensile strength of the material formerly used, increases the production rate of the switchboard-wire-insulating machines up to 46%. And the superior insulating properties of "Mylar", along with its physical properties, give many other important advantages.

For example, Stromberg-Carlson tests show a three-to-one improvement, after humidity exposure, for the insulation made with Du Pont "Mylar". What's more, "Mylar" is tough, flexible, heat-stable, has good aging qualities . . . and it reduces the outside diameter of finished wire by approximately 5 mils.

Whether you make fine wire or high dielectric communications cable, "Mylar" polyester film can help improve manufacturing techniques . . . reduce weight and diameter. That's because "Mylar", with its high dielectric strength, is tough and durable, even in thin gauges. Non-hygroscopic-"Mylar" is inert to attack from most chemicals or solvents and has a high melting point.

• • •

FOR MORE INFORMATION on properties, applications and types of "Mylar" available, send in the coupon below. Be sure to indicate the specific application you have in mind.

*"*Mylar*" *is a registered Du Pont trademark for its brand of polyester film.*

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DU PONT MYLAR® POLYESTER FILM

E. I. du Pont de Nemours & Co. (Inc.)
Film Department, Room WW-2, Nemours Bldg.
Wilmington 98, Delaware

Please send your new booklet on properties, applications and types of "Mylar" available for wire and cable applications.

Application_____
Name_____
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MEMO TO: *You*

YOU MIGHT AS WELL try to count the beans in a carload as the number of parts that are made of Roebling High Carbon Specialties, Flat Wire and Spring Steel. These Roebling products are unsurpassed for mechanical and dimensional uniformity . . . for speeding manufacturers' production and cutting costs.

Next time you order cold rolled high carbon wire or spring steel specify Roebling. Strictly on its performance you'll probably become a steady customer from then on. John A. Roebling's Sons Corporation, Trenton 2, N. J.

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● Unless you yourself go in for forming wire springs, you have no idea what a tricky business it is. For one thing, as every fabricator knows, it takes extreme uniformity in the wire to obtain the precise dimensions and the exacting tension, torsion or compression characteristics so often required.

But uniformity alone won't always do the trick! As a leading supplier of special wire for tougher-than-usual spring requirements, National-Standard has delved deep into production problems and has come up with answers that help many a fabricator hold better to tough specifications and produce faster with less waste and more profit!

Time and again, for example, National-Standard has shown that merely a change in wire *coating* or lubrication quality is of major importance in forming operations. Proper coating also helps gain uniform dimensional response to heat treating. Quite often, in fact, troubles chalked up to wire variance are really the fault of improper coating or finish.

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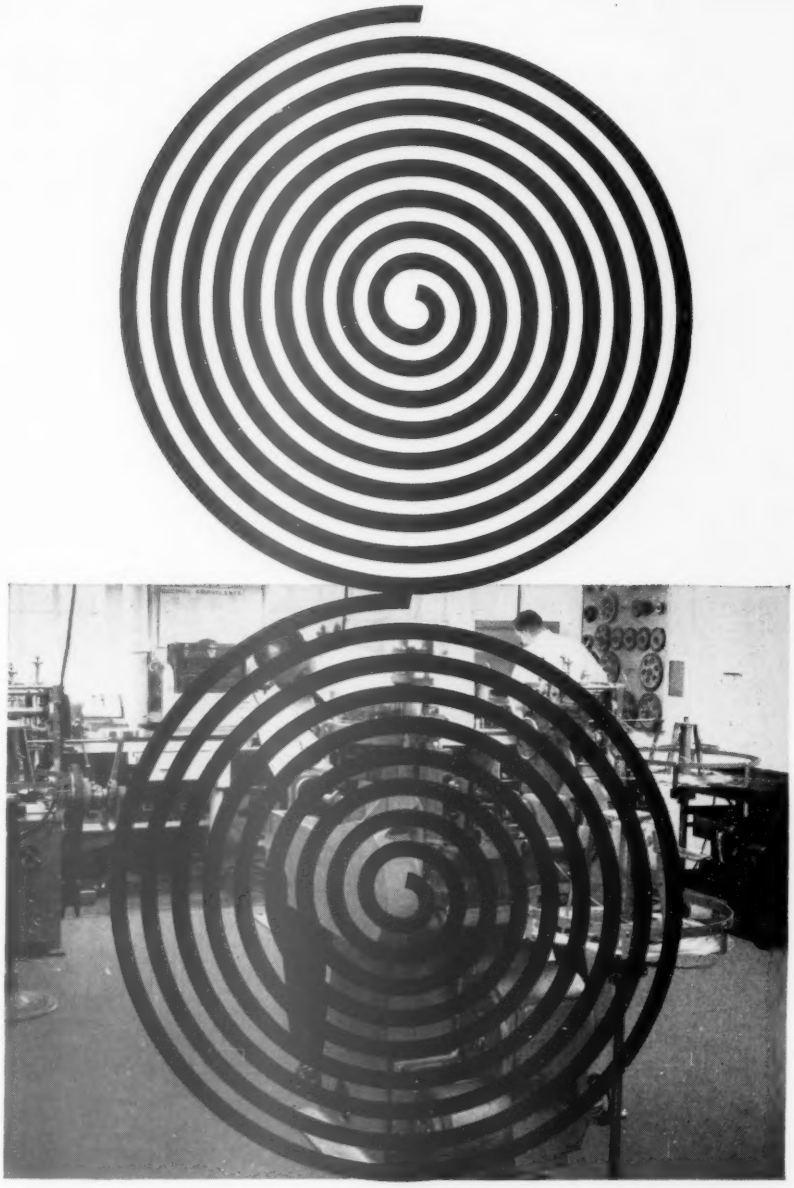
Torrington leads the field in the development of the most advanced wire forming equipment available today. One of the reasons is Torrington's Wire Forming Laboratory, devoted exclusively to the professional springmaker's problems. This kind of close and constant study of our customers' needs has resulted in wire forming machinery tailored to meet the toughest requirements for versatile and economic production. If *you* have problems in coiling or costing, your inquiries will be classified CONFIDENTIAL!



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The many new headings, new products, address changes and other important information changes in the listings of sources of bars, rods, wire, wire products, electric wire and cable and of sources for machinery, equipment and supplies used in the Wire Industry, make this directory

INDISPENSABLE!

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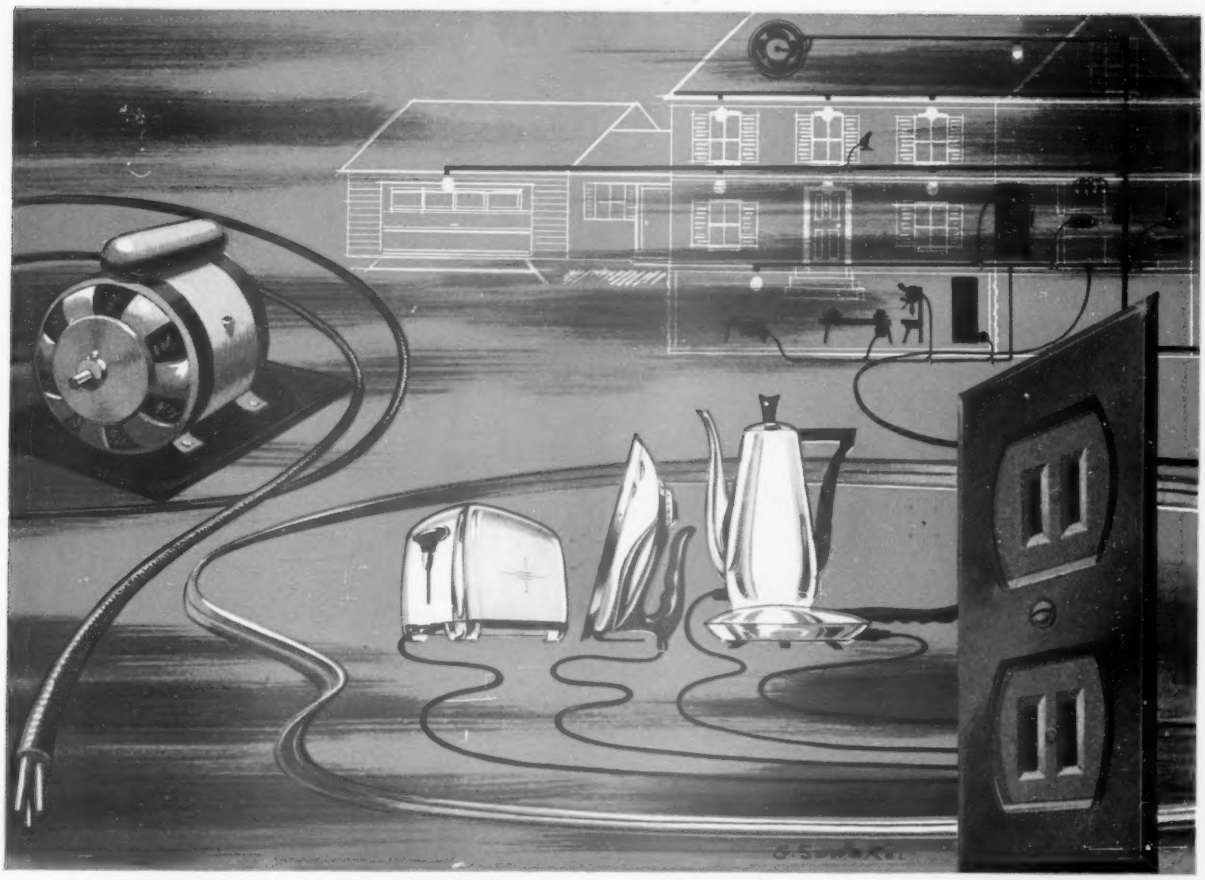

four resins for electrical application

NAUGATUCK now offers the Wire and Cable Industry *more* PVC resins for insulation extrusion than does any other resin manufacturer.

Two of these Marvinol® resins, VR-22 and VR-23, have already received UL approval. These resins are, respectively, of high and intermediate molecular weight. Both have good dry blending properties.

Marvinol VR-24 and Marvinol MX-2206 are resins of lower molecular weights. They provide high volume resistivity in semi-rigid compounds with little or no plasticizer. Both deserve your careful evaluation for future electrical products.

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for **every** type of wire

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- absolutely straight
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Type RA 7 - for wire from 17-2 S.W.G.

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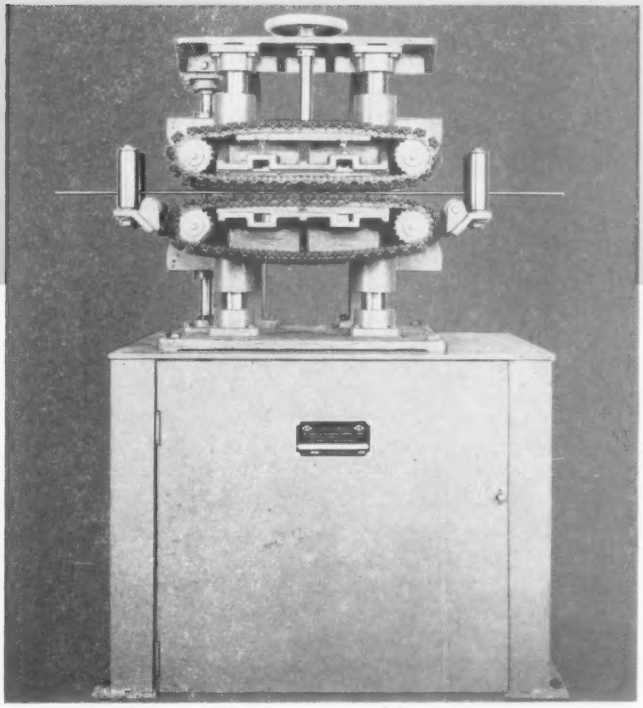

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PULLS CABLE STRAIGHT WITHOUT BENDING OR DAMAGING WIRE SURFACE

The most improved method of pulling cable through extruders, cablers and strander machines is with an Entwistle Caterpuller. The compact size, low maintenance costs and damage-free tendency of the Entwistle unit makes the Capstan method of pulling cable obsolete. Exacting horizontal pull is applied to the wire as it passes between the two belts of rubber gripping treads. Caterpullers are available in three sizes. Each Caterpuller is designed and built to individual specifications and pulling requirements. A minimum amount of floor space is needed for installation. Maintenance costs are very small compared to other pulling units.

Investigate how you can step up your plant production, reduce cable damage and cut maintenance costs. Write today for details.

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Vertical Caterpuller

Traction Length	20 inches
Maximum Cable Size	3 inches
Minimum Cable Size	3/16 inch
Pulling Force	700 lbs.*

CLASS C TYPE C
Vertical Caterpuller

Traction Length	40 inches
Maximum Cable Size	6 inches
Minimum Cable Size	3/16 inch
Pulling Force	6600 lbs.*

CLASS C TYPE CHA
Horizontal Caterpuller

Traction Length	40 inches
Maximum Cable Size	6 inches
Minimum Cable Size	3/16 inch
Pulling Force	6600 lbs.*

**Will vary with speeds and type of drive.*

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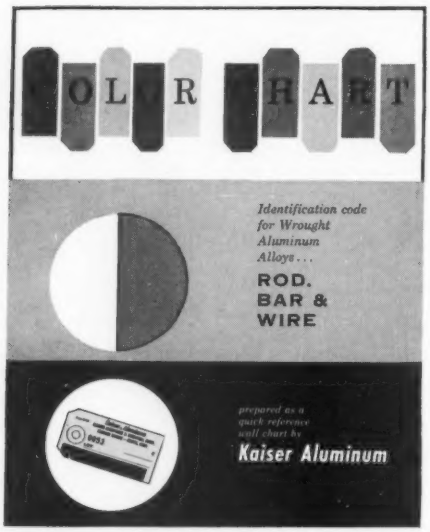
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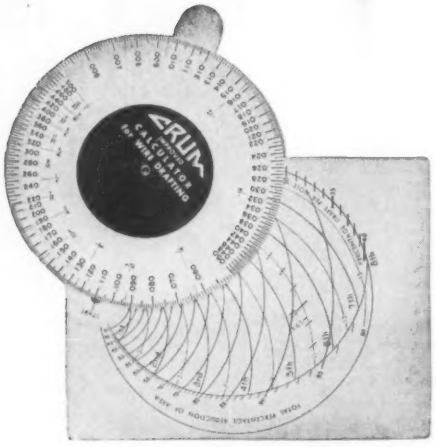

Front view of Crum Calculator.

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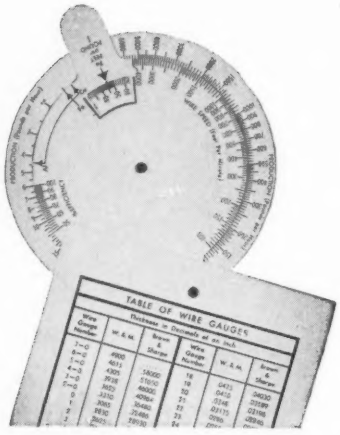

Reverse view of Crum Calculator.

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- Intermediate lines provide reductions for 16 holes in one setting.
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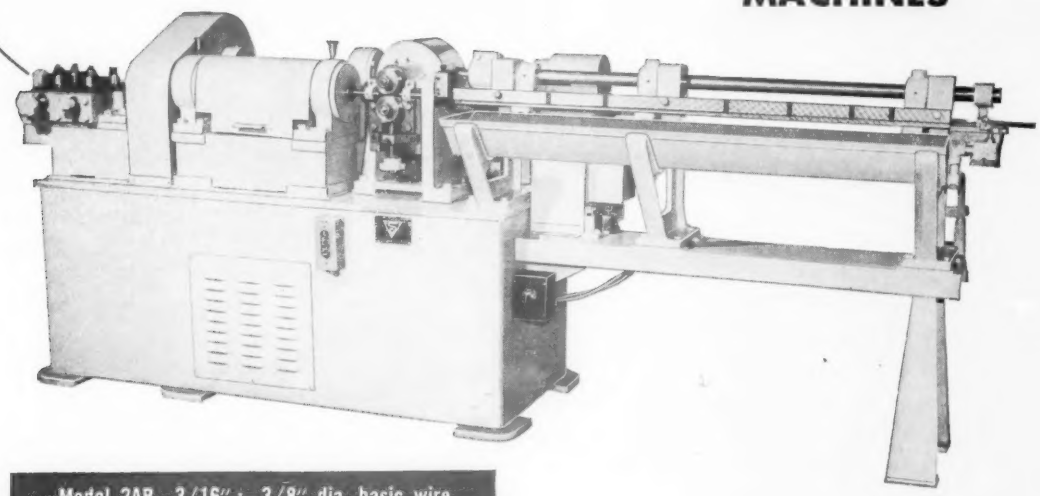

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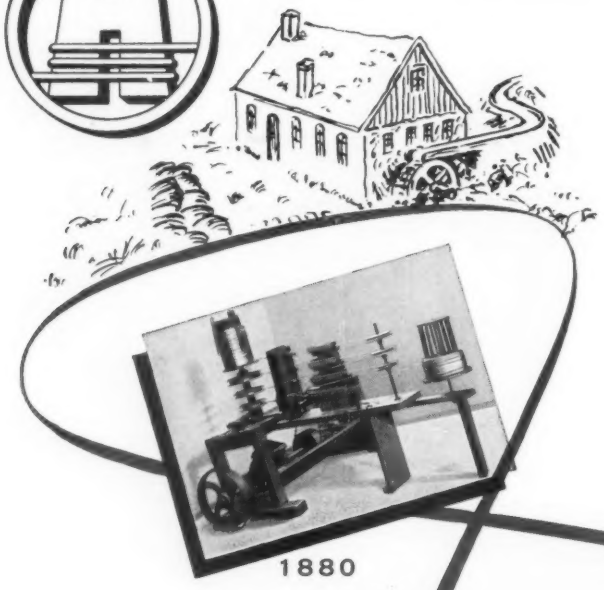

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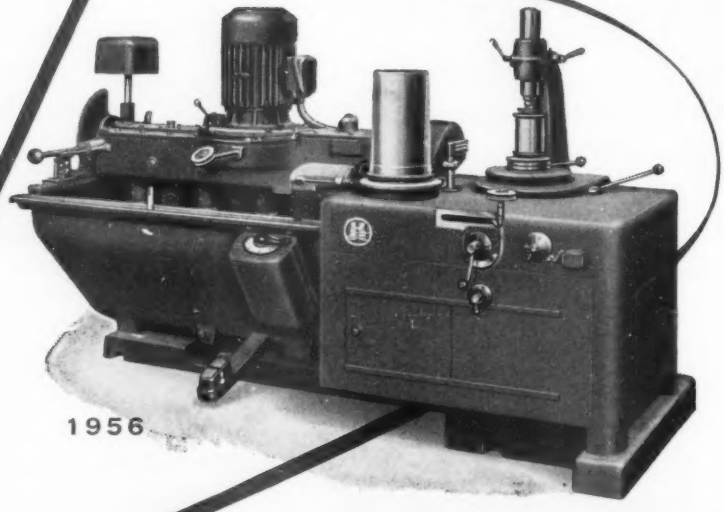

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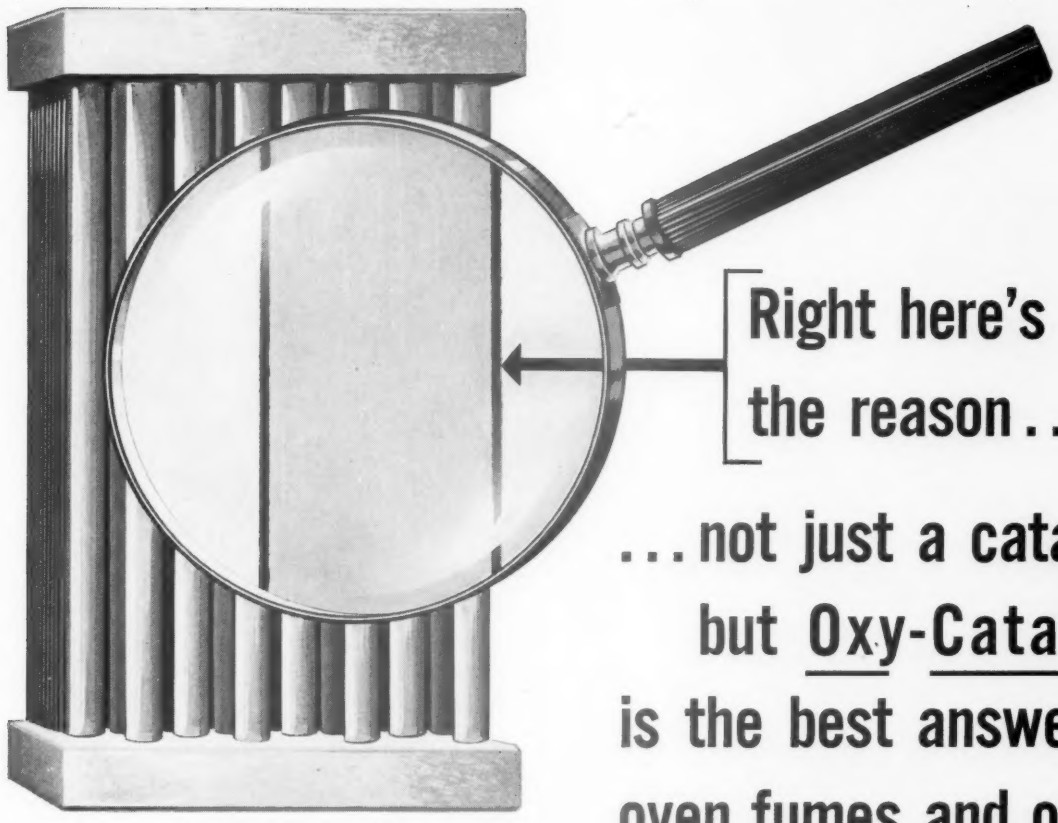

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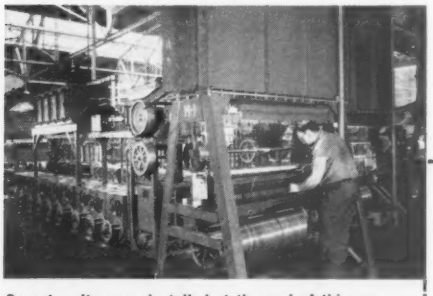

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The Wire Outlook

The keynote of 1957 is confidence, confidence in the future on the part of the public and on the part of America's industrialists. Having just completed our most prosperous year, during which huge expansion projects were planned, the country is looking forward to continued growth and high levels of activity.

A great majority of our busines leaders have expressed optimistic opinions to an extent never before recorded, while a small minority are willing only to grant that the first quarter can be counted on to hold up. The bulls expect that sales, inventories, profits, employment and prices will be higher. Among the bears, anywhere from 6% to 20% expect that one or another of these categories will be lower this year.

Steel men, we are happy to report, are among those who look for good business and, even with our present 133,500,000 tons of ingot capacity, a majority feel that capacity production will be the rule for the first six months at least.

More money will be spent by the Government this year for some items on which there is always a question as to their wisdom. Increased amounts will go abroad, much of it ill-advised as to actual need or method of spending, in an effort to keep Communism from gaining a foothold in impoverished and weak countries. Drought areas will be given aid. Farmers will be assured of larger payments for things they do not raise under the crop control program. Communities will receive more help in building schools. Airport construction is down for Federal aid. Money for hospitals, flood-control and more big dams is to be made available. Unless one is a direct beneficiary of these subsidies, it all comes out of the taxpayers' pockets and explains why taxes are not being reduced. Congress nearly always is liberal in spending your and my money, but many of the bureaus it has set up are downright wastrels with it.

Aluminum is expected to push ahead, with shipments during the first half 7 to 8% over the same period last year. Bare aluminum wire production in the first 9 months of 1956 was up 77.4% over the same period in 1955.

Copper is now in plentiful supply for electric wire manufacture. Building wire has fallen off due to the drop in home construction and wiring for the electronic industry will be slow for a while, until the big inventories of TV sets and radios can be worked off. However, power and communication wire sales should offset the slow items as the utilities get along with their expansion plans.

The demand for steel wire rods is anything but spectacular, because of the slackened demand for wire. Automotive wire was slow, but showed improvement in January. Heading wire orders have been spotty, although the prospect for the year is considered good, one of the largest cold headers anticipating a 3% rise in 1957. Fencing and other merchant products should be picking up about now for the spring trade. Wire fabric demand is building up nicely. Many wire mills are operating well under capacity for the time being, an unusual situation in an industry that normally runs ahead of the general average.

The machinery and equipment business should prosper in the next few years. The total for 1956 was 15% over 1955, with every promise holding up well through this year and beyond.

This year will be one of keen competition. It will not alone be a competition between business enterprises, but will be one of materials too. New metals will vie with old, non-metallic materials will try to displace metals, and so on.

Some industries have expanded too fast, as, for example, textiles. Most have not. The growing population requires added production to keep pace with its basic needs.

Retail sales forecasters expect 1957 to show sales increases of 2 to 3%. If the latter, cash registers will ring up a total of $197,700,000,000 this year, about 5.75 billions more than 1956. This is so staggering a volume of business the imagination cannot visualize it.

It is, however, a bit of statistical evidence that when people have money and confidence, it goes out for manufactured products—keeping business good.

Edmund Duval Sickels

EDITOR

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Vol. 32 February, 1957 No. 2

Speed Variator Drives for Extruders And Wire Insulating Extruder Lines

by R. K. Larson
Metalworking Machinery Engineering
Equipment Industries Engineering Section
Component & Intermediate Distribution
Sales Department
General Electric Company
Schenectady, New York

The author has outlined in this article those drives that, used with improved extruder temperature controls, non-contact diameter measuring equipment and automatic take-up reel stands, should insure better extruded coatings and lower costs.

In the past ten years there has been a tremendous growth in the use of thermoplastic materials for wire insulation, tubing, gasketing, and other similar products. At the same time there has been a little, if any, decrease in the demand for similar extruded rubber products. To supply this rapidly growing market many new extruders have been installed both as individual units for the production of tubing and other shapes, and as part of wire insulating lines.

★ ★ ★

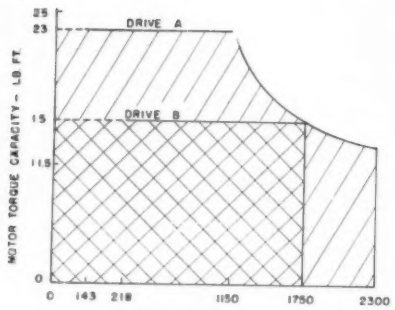
As with all production machinery, each new installation has presented a challenge to the machinery builders and the manufacturers of extruded products to obtain increased output, with improved quality, at lower cost. While a substantial part of the effort to attain these objectives has been devoted to improvements in machine design and processing techniques, it has been found that much can be accomplished by taking full advantage of the flexibility offered by adjustable voltage, direct current electric drives. This has been particularly true since the introduction of the Speed Variator type of "packaged" adjustable voltage drive which is very convenient to install, requires minimum factory floor space, and generally can be offered at a lower cost than open motor generator sets with separate control panels.

What is a Speed Variator Drive?

Speed Variator is the General Electric name for a packaged, adjustable voltage direct-current motor drive. Each drive includes a motor-generator set and all necessary control completely enclosed in a metal cabinet with a self-contained, filtered air supply system, a direct-current motor, and suitable control stations for starting, stopping, and adjusting the speed of the direct-current motor.

★ ★ ★

Standard Speed Variator drives, completely pre-engineered, are available from stock or with very short shipment in a wide range of horsepower ratings. All horsepower ratings are available with several different speed ranges, some with only armature voltage control and others with both motor field and armature voltage control to give either constant torque or combined constant torque and constant horsepower capacity (See Fig. 1). Standard speed ranges vary from 8:1 to 16:1 depending on the horsepower rating of the drives and whether only constant torque capacity or both constant torque and constant horsepower capacity are required. The speed of all drives, regardless of horsepower rating or normal running speed range, can be controlled to practically zero speed, although motor heating may prevent con-



DRIVE A, RATED 5 HP – 143/1150/2300 RPM

DRIVE B, RATED 5 HP – 1750/218 RPM

TYPICAL SPEED VARIATOR DRIVE CHARACTERISTICS

FIG 1

tinuous operation below the minimum listed speed. If specified, any drive may be supplied to give smooth speed control down to standstill.

How Does the Standard Speed Variator Drive Operate?

The motor-generator set is first started by means of a control station mounted on the power unit cabinet and will then run continuously during normal operation. A second control station, mounted in a location convenient for the operator, is provided to start and stop the direct-current motor (See Fig. 2). With all standard Speed Variator drives, the direct-current motor may be started and stopped in either of two ways. If very accurate control of the acceleration and deceleration rates is desired, the speed control rheostat may be set on zero before pressing the start button and returned to zero before pressing the stop button. The operator may then change the speed at any desired rate by turning the speed control rheostat. If less precise starting and stopping control is satisfactory, the operator may leave the speed control rheostat set for the proper running speed and simply press the start and stop buttons.

★ ★ ★

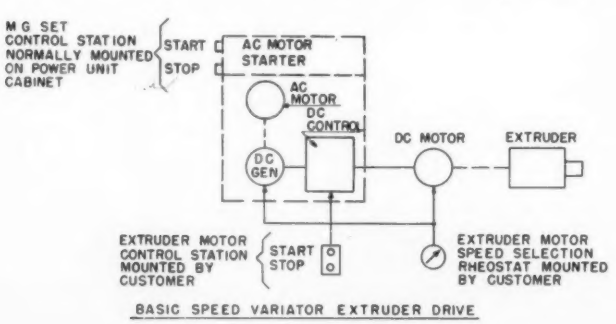
Standard Speed Variator drives that use both armature and field voltage control of the motor speed always increase the motor armature voltage to the rated value and then reduce the motor field voltage to reach top speed during starting. The drive motor armature current will remain essentially constant as the motor speed is increased by armature voltage control, and will steadily increase as the motor speed is raised by reducing the motor field voltage. In all cases the motor armature current will increase temporarily while the drive is accelerating and decrease momentarily during deceleration due to the motor and load inertia.

★ ★ ★

Speed Variators are adjustable rather than variable speed drives. This means that after the desired speed has been selected the drive will maintain essentially the same speed despite variations in load or temperature. Normally, the speed variation of a standard Speed Variator drive will not be more than 5 to 15 per cent of the rated top speed over a period of several hours. The exact value will depend on the magnitude of the load and temperature changes.

★ ★ ★

The minimum continuous running speed for any Speed Variator drive will be limited by motor heating. With low ambient temperatures or light loads, the motor can be operated at lower speeds than with heavy loads or high ambient temperatures. The minimum continuous running speed can be made independent of these conditions by providing a blower to force ventilate the motor.



BASIC SPEED VARIATOR EXTRUDER DRIVE

FIG 2

Speed Variator Drives For Extruders

Speed Variator type drives have achieved almost universal acceptance for extruders of all types, rubber, nylon, and PVC. Some of the many characteristics that make this drive so desirable for extruders include:

FEATURES OF STANDARD DRIVES

Wide running speed range with essentially stepless speed selection **allows accurate adjustment of screw speed to obtain the best speed for each compound and product size.**

Very low warmup speed **aids in reducing waste while bringing compound up to operating temperature and running out air bubbles.**

Extra torque capacity at reduced screw speed, **by using combination of motor field and armature voltage control, high screw speeds can be used for soft compounds while increased torque will be available at reduced speed for stiff compounds.**

Convenient speed selection, **the speed control rheostat can be mounted in any location convenient to the operator and the screw speed may be adjusted at any time before starting or while running.**

Reduced shock loads on mechanical equipment, **the smooth acceleration control available can be used to eliminate shock loads during starting.**

Dependable, downtime-free operation, **direct-current motors are inherently free from many of the shock loads and wear problems of mechanical drives, and have proved their dependability on thousands of applications.**

Simplified ordering and installation, **since the motor-generator set and all control is supplied as a single unit completely assembled in a compact enclosure, ordering, installation, and engineering costs are kept to a minimum.**

ADDITIONAL FEATURES THAT CAN BE OBTAINED

Screw speed indication, **tachometer generator and speed indicating meter can be provided to allow accurate selection of the best screw speed for each product.**

Load indication, **a motor armature current ammeter can be supplied to indicate extruder load so that full advantage can be taken of the drive's capacity without danger of overloads.**

Overtorque protection **will stop drive immediately if foreign object jams a screw or low compound temperature would require torques sufficient to damage the extruder.**

Automatic timed acceleration and deceleration, **by using a motor operated rheostat or by an electronic timing circuit, smooth starting and stopping control can be obtained auto-**

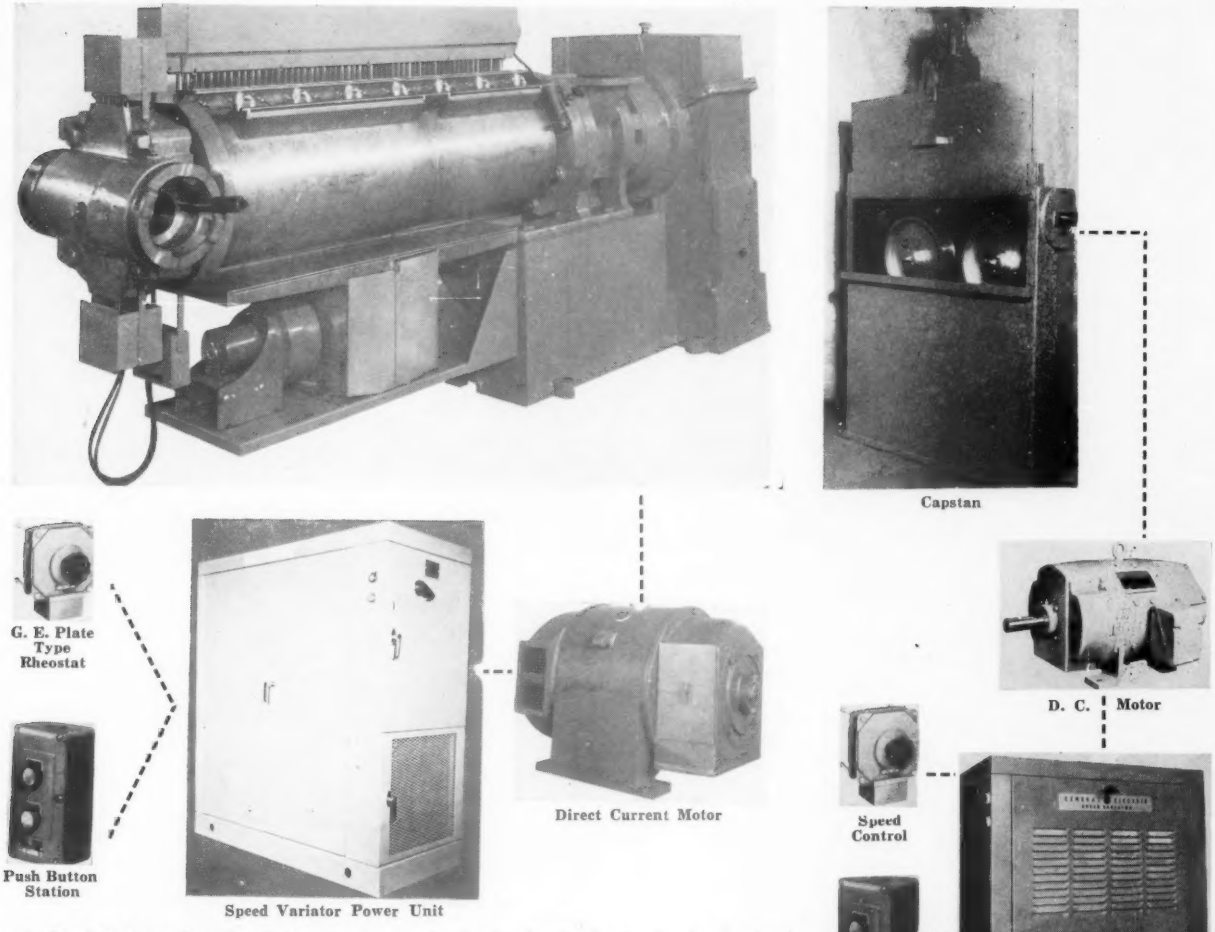


Fig. 3—Speed Variator Extruder Drive. * * * * * * * * * * * * * * * *

Fig. 4—Speed Variator Capstan Drive. * * *

matically.

Speed regulated drive, **automatic control can be provided to compensate for load and temperature variations to accurately maintain any desired speed.**

Speed Variator Capstan Drives

Almost all new wire insulating extruder lines use a separate Speed Variator drive for the capstan in addition to the extruder Speed Variator drive. This arrangement not only provides the same advantages of wide running speed range, very low threading speed, convenient speed adjustment, and dependable operation for the capstan as for the extruder, but also offers several additional advantages:

FEATURES OF STANDARD DRIVES

Elimination of mechanical connection between extruder and capstan **allows complete freedom in selecting the location of the capstan without requiring an awkward, expensive line shaft.**

Independent capstan operation, **completely separate operation of the capstan is available at all times for convenience in threading.**

Very wide capstan/extruder speed ratio selection, **both the capstan and extruder drives may be operated at any point within their respective speed ranges at any time so that the screw speed/wire speed ratio may be varied both above and below the nominal 1:1 ratio to suit the requirements of all combinations of wire diameter and insulation wall thickness.**

ADDITIONAL FEATURES THAT CAN BE OBTAINED

Extruder and capstan interlocking, **the two drives may be interlocked to insure starting and stopping together, independently, or in any desired sequence.**

Master speed control, **a master speed control rheostat can be provided to simultaneously raise and lower the speed of both the capstan and extruder drives while maintaining approximately the desired speed ratio.**

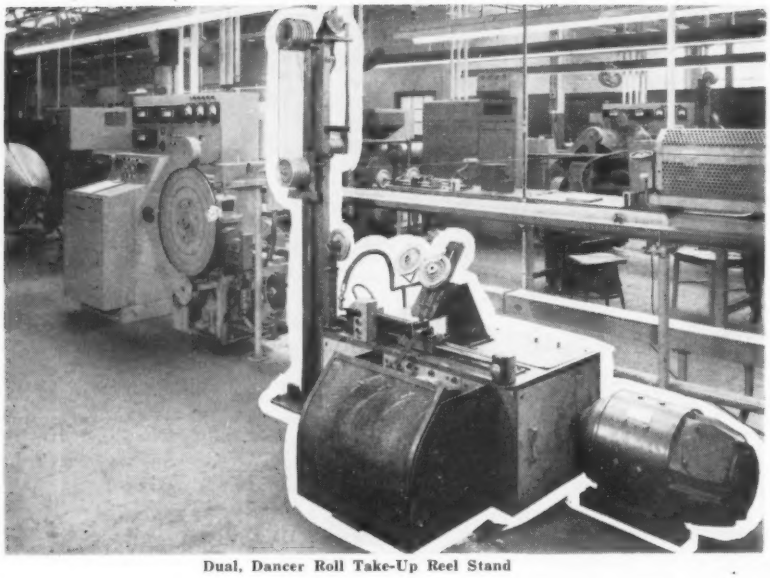
Very precise speed ratio selection, **by using a vernier speed control rheostat for the capstan in addition to the main speed control rheostat, almost infinite adjustment of speed ratios can be obtained.**

Speed Variator Reel Drives

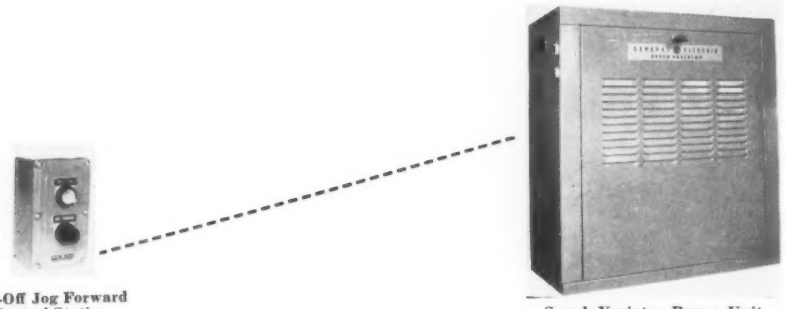
Extruder line reel drives effectively require a dual speed range, to follow changes in linear wire speed and to match the variation in reel diameter. The total speed range may be obtained by a combination of a Speed Variator drive and a mechanical, adjustable speed drive, or by a Speed Variator drive alone.

★ ★ ★

The simplest type of Speed Variator reel drive is obtained by using a separate motor for the takeup reel stand and supplying this motor from the capstan power unit (See Fig. 6). With this arrangement, the reel speed will vary in proportion to the capstan speed at all times. With large wire or cable at low speeds, a friction clutch may be used between the reel motor and the reel to allow



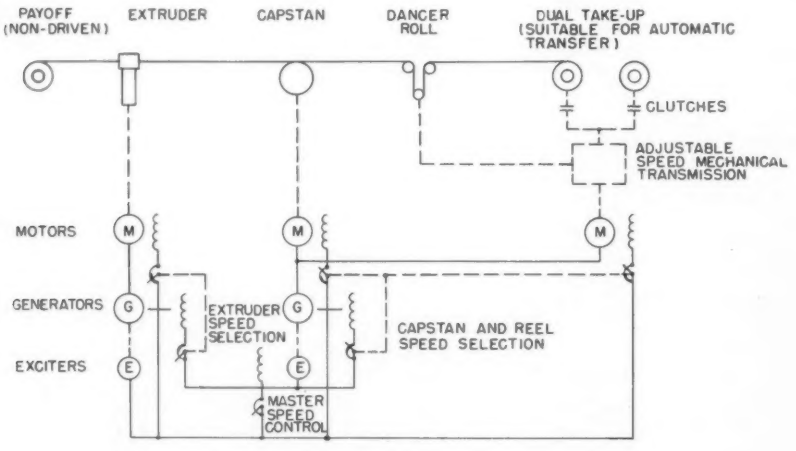
Dual, Dancer Roll Take-Up Reel Stand



On-Off Jog Forward Control Station

Speed Variator Power Unit

Fig. 5—Speed Variator Reel Drive.



WIRE INSULATING EXTRUDER LINE USING SEPARATE SPEED VARIATOR POWER UNITS FOR EXTRUDER AND CAPSTAN

FIG. 6

the speed of the reel to decrease as the diameter increases, while a dancer roll controlled, mechanical adjustable speed transmission may be used with small wire at high speed.

★ ★ ★

This arrangement provides two major advantages over a completely mechanical drive. The cost, space, and maintenance requirements of a line shaft between the capstan and the reel stand are eliminated, and the drive can easily be arranged to allow separate, low speed operation of the reel for convenience in threading.

★ ★ ★

With a dual takeup reel stand, it is usually desirable to provide a separate Speed Variator power unit for the reel (See Fig. 7). During the transfer operation the incoming reel must accelerate, either from standstill to the correct empty reel speed or from full reel to empty reel speed. This causes a substantial, very rapid change in load on the power unit generator. If the same generator supplies both the capstan and reel motors, this load change will cause a variation in capstan speed. This source of capstan (wire) speed variation is climinated when separate power units are used for the capstan and reel motors.

★ ★ ★

Speed Variator reel drives may also be used to give full control of the reel speed so that a friction clutch or mechanical, adjustable speed transmission is not required. Best performance will be obtained with a separate power unit for the reel motor. In general, dancer roll control will be used for the same range of wire sizes and wire speed with the all electric reel drive as would be used with an all mechanical or combination mechanical and electrical reel drive (See Fig. 8).

★ ★ ★

The all-electric reel drive offers several distinct advantages over the combination electrical and mechanical drive:

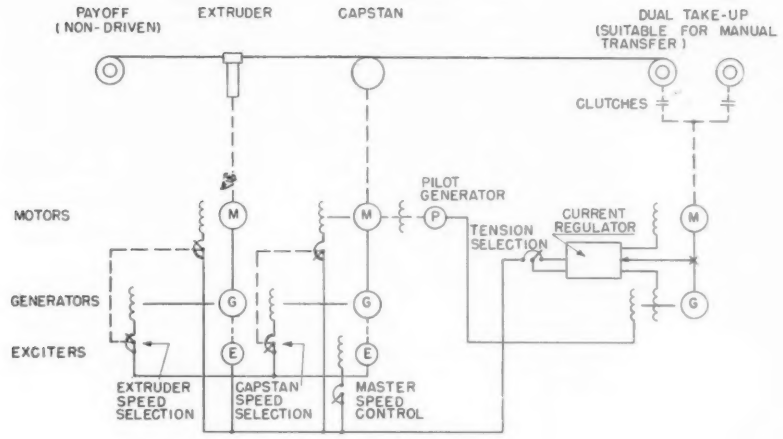
Fewer wearing parts, **since a mechanical clutch or transmission is eliminated.**

Simpler, more compact equipment at the reel stand, **only the reel motor is mounted on the machine.**

Smoother tension control when dancer rolls are not required, **since electrical torque control is inherently softer than friction torque control.**

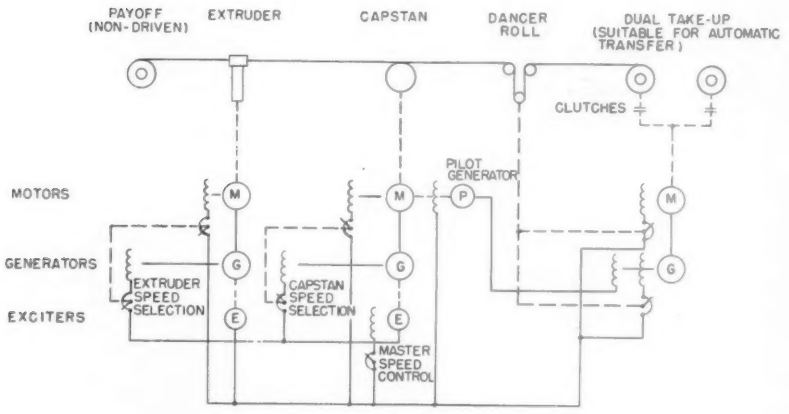
More convenient tension adjustment when dancer rolls are not required, **since the tension rheostat can be mounted in any convenient location and easily adjusted during running.**

More nearly constant tension when dancer rolls are not required, **as sim-**



WIRE INSULATING EXTRUDER LINE DRIVE USING SEPARATE POWER UNITS FOR EXTRUDER, CAPSTAN, AND REEL WITHOUT DANCER ROLL CONTROL

FIG. 7



WIRE INSULATING EXTRUDER LINE DRIVE USING SEPARATE SPEED VARIATOR POWER UNITS FOR EXTRUDER, CAPSTAN, AND REEL WITH DANCER ROLL CONTROL

FIG 8

ple friction drives normally develop constant torque while electric drives will generally be designed to provide increased torque with increased reel diameter.

Tandem Operation of Speed Variators for Wire Insulating Extruder Lines

Speed Variator drives can easily be arranged so that the speed of the entire line, extruder, capstan and reel can be adjusted from one master control dial. Normally, the control will be designed to give the operator complete freedom to select either full range speed control of both the extruder and the capstan-reel sections independently, or to preset the desired running speed of each section before starting and then adjust the speed of the entire line with the master control rheostat.

Regulated Speed Variator Drives

Standard, non-regulated Speed Variator drives depend on the inherent, constant speed characteristics of a shunt wound, direct current motor to maintain a selected speed. With these standard drives, extruder and capstan speed variations of 5% to 15% based on the rated speed may occur over a period of several hours unless the speed control rheostats are readjusted by the operator. These variations may be caused by changes in load or temperature, and the degree of speed change will be a function of the magnitude of the load or temperature change.

★ ★ ★

To reduce even these relatively small speed variations, speed regulating control can be supplied for the capstan and extruder drives. With this type of control, the speed variations may be limited to from 0.2% to 3% of the rated top speed, again depending on the magnitude of the load or temperature changes and the rate at which they occur. Regulated drives may allow substantial cost savings in material and may increase the number of machines that can be served by one operator. Experience has indicated that regulated drives are most effective in reducing manufacturing cost on lines that produce a large volume of a relatively limited number of products.

CONSIDERATIONS INVOLVED IN SELECTING A REGULATED DRIVE

The primary objective of a wire insulating extruder line is to maintain a selected insulation wall thickness. Since this is a function of the relative speeds of the capstan and the extruder, it is logical to plan to regulate the speed of either the capstan or the extruder relative to the other drive section. Some drives have been installed that regulate the capstan (wire) speed relative to the extruder while others regulate the extruder speed and use the capstan speed as a reference. Both systems have given satisfactory results but sufficient data is not available to show a marked superiority of one system or the other. In general, industry opinion tends to favor using the extruder as the master section for PVC or nylon extruder lines to avoid the problems associated with temperature control and elastic properties of the plastic material. With this arrangement it may be necessary to use very low acceleration and deceleration rates to prevent difficulty with the reel drive under some operating conditions.

On continuous vulcanizing extruder lines the need to maintain constant wire speed to insure proper curing favors the use of the capstan drive as the master section, but it is doubtful if this must be considered a ruling factor since the wire speed will be essentially constant during running even when the extruder is used as the master section. A third arrangement can be used in which neither the extruder or capstan is used as a master drive section. Instead, a master speed reference is established for both the capstan and the extruder drives. This may make it possible to obtain more accurate speed ratio control under some conditions, but it either introduces the same acceleration and deceleration problem that is present when using the extruder drive as a master section, or makes it impractical to automatically maintain a selected speed ratio.

EXTRUDER AND CAPSTAN SPEED RATIOS

With regulated drives using either the extruder or the capstan drive as a master section, care must be taken in selecting the range of speed ratios required. If, as is usually the case, the capstan must be able to operate at either a higher or lower percentage of its top speed than the extruder for any given extruder speed, both the upper and lower limits of the speed ratio must be established. This is best done by specifying the minimum extruder speed at the maximum wire speed and the minimum wire speed at maximum extruder speed. Since the speed control accuracy of the system is reduced by operating the follower section at a higher relative speed than the master section, this part of the range should be kept to an absolute minimum.

If a wire speed range of more than 10:1 is required, best results will be obtained by introducing a gear change transmission at the capstan and reel stands to obtain wire speeds below 10% of the maximum wire speed even when using a regulated drive.

CAUSES OF EXTRUDER AND CAPSTAN SPEED VARIATIONS

Gradual load change, this source of speed variation may be considered to include load changes that occur at a relatively slow rate, on the order of magnitude of 15 seconds or more for a 100% change in load. Such load changes might result from variation in friction, compound temperature, or compound properties for the extruder, while at the capstan they might result from change in friction or windage loads or from adjustment of the reel tension setting. By electrical industry convention, the term "speed regulation" when used with no further qualification refers to speed change caused by this type of load variation. In general, this type of load change is a minor consideration on wire insulating extruder lines.

Rapid load change, this classification includes load variations that occur in a period from a few tenths of a second to a few seconds. It is very difficult to prevent speed changes caused by this type of load with a regulator, and normal speed regulators are not designed to compensate for them. These load variations might be caused by the "loading" action of the dry charge on the extruder screw or by slight imperfections in the screw or barrel of the extruder. They may be caused at the capstan by a "flying transfer" with a dual reel takeup stand when the reel motor is supplied from the capstan power unit. While special regulator design can minimize the affect on speed of this type of load, it will usually be simpler and more economical to increase the inertia of the extruder drive, use oversize equipment, and use a separate power unit for the reel motor.

Temperature drift, over any given period of time, from a few minutes to several hours, the temperature of both the drive and machine components of an extruder line will change due to the load and the ambient temperature. The speed of both the capstan and extruder drives will vary with these temperature changes. Since this variation is quite gradual, the operator can easily readjust the speed selection control to compensate for this condition. However, when several lines will be served by one operator it may be desirable to use speed regulating control to reduce this variation. Since not all speed regulators fully compensate for this condition, it is desirable to specify regulators designed for this function to reduce speed changes from this source to less than 2% of the rated drive speed.

Accuracy and Speed Ratio Control

Speed regulation is always expressed as a percentage of top speed, and the absolute (rpm or fpm) change in speed may be essentially the same at reduced speed as top speed. As a result, a drive with a speed regulation of 1% at top speed may have a regulation of 10% of the **actual speed** at 10% of rated speed. On a wire insulating extruder line, it is usually change in selected speed ratio that is important, and with a conventional regulated drive the ratio will usually be maintained within from 1% to 5% over a 10:1 speed range. Due to the many operating conditions that may exist, it is seldom realistic to ask that a drive be guaranteed to maintain a selected speed ratio within definite limits, but it is reasonable to expect to obtain the above accuracies with normal, industrial quality regulators on most applications.

Direct Diameter Measurement

Most existing wire insulating lines depend on manual micrometer measurement of insulation diameter by the operator, but several very successful installations have been made using continuous, non-contact type gages. These gages can be used in conjunction with Speed Variator capstan and extruder drives to provide continuous, automatic control of insulation diameter. This arrangement offers considerable promise as a means of holding closer tolerances on insulation diameter since it provides direct control of the diameter rather than the indirect control obtained when the relative capstan and extruder speeds are used as a measure of insulation thickness. It may be used with either regulated or non-regulated extruder and capstan drives.

Speed Indicating Equipment

Two factors should be considered when selecting speed indicating equipment for wire insulating extruder lines.

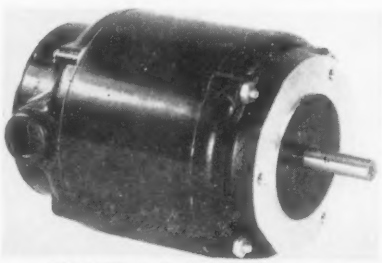
1. **For best accuracy the tachometers should always be coupled to run at their maximum rated speed at the maximum machine speed.**
2. **If multi-speed gear transmissions are used on the capstan and reel stands to extend the wire speed range, the tachometer may be mounted on either the input or output end of the transmission. If mounted on the input side of the transmission, the tachometer will operate over a narrower speed range, but the indicating instrument must be equipped with multiple scales. Most customers prefer to couple the tachometer on the output side of the transmission to avoid multiple scales, but since this requires the tachometer to operate over a very wide speed range, it is desirable to use high accuracy tachometer equipment to obtain reasonably accurate speed indication at very low speeds.**

TACHOMETER GENERATORS

***Low cost, low speed, moderate accuracy*, suitable for coupling direct to the extruder screw. Accuracy probably will not be satisfactory for screw**

(*Please turn to page* 214)

DO-78 X Meter (Rectifier Type)



5SMY54H821 Tachometer Generator (A. C. Current)

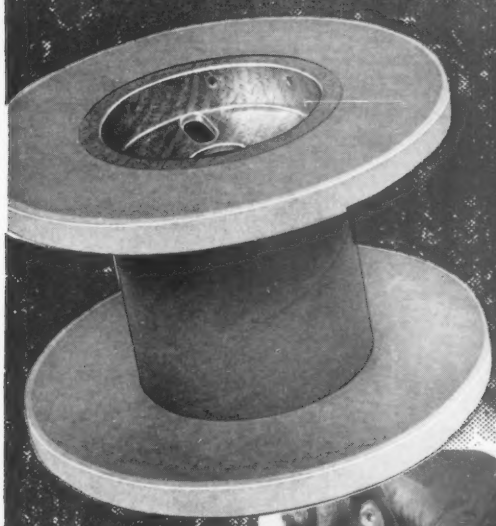
Fig. 9—Low Speed, Moderate Accuracy Tachometer Generator and Moderate Accuracy, Medium Scale Meter.

HERE IS OUR NEW

NON-returnable reel...

...with the improvements you asked us to make!

FOR PACKAGES UP TO 100# CAPACITY



EASY HAND LIFTING

NO FLANGE BREAKAGE OR DISTORTION

SHEET METAL PAY-OFF RING

YOU TOLD US WHAT YOU WANTED

HERE IT IS!

We pioneered this disposable reel, announced the process, built pilot models and put them into plants for 8 months of testing.

Then we surveyed all users, found what they liked and disliked, made the changes they wanted — and here it is! — A practical, useable, foolproof NON-returnable reel that reduces shipping costs, saves bookkeeping and gets the job done better with less trouble!

This is the packaging process of the future . . . here today!

1. Look how easy you can pick it up by hand! Sheet metal cup adds rigidity, provides drive hole and serves as hand grip for lifting.
2. Tremendous strength. Flange has 5 to 1 safety factor. You can lift 100# of wire by the flange without danger of cracking the head or having it pull off.
3. Unlike other reels on the market, these flanges absorb shocks and will not transmit shock to the wire.
4. This insures wire arriving in good condition, and no take-off trouble in the plant.
5. Inexpensive sheet metal pay-off ring insures trouble-free removal of wire. Ring can be used when removing wire over the head or with de-reeling stand employing a rope friction drag.
6. Your name identification and product specifications now in LARGE letters, 2 colors, covering entire head. Five times previous size to improve legibility.
7. Reel fits your present equipment without changes.
8. A truly NON-returnable reel at low cost. LIGHT WEIGHT for big freight savings. Every package bright, clean, new and good looking!

ACROMETAL PRODUCTS IN

Wire Plated Before Drawing By Novel Spiral Process

by Orville E. Adler

Director of Research

National-Standard Company

Niles, Michigan

Applying its 50 years of wire-making know-how to a promising electroplating development, National-Standard Company, Niles, Mich., has come up with good news for users of nickel wire.

★ ★ ★

The company has perfected an automatic, continuous process for applying a heavy, ductile nickel deposit on steel wire, with or without intermediate deposit. Electrodeposition of other metals, such as copper and brass, has also proved successful.

★ ★ ★

Significant savings of scarce nickel are promised by the jacketed material. In the lamp, radio and television industry, nickel-coated steel wire has proved highly successful in grid supports, lamp leads and small parts. Nickel metal savings: up to 95 per cent.

Improvements in the Kenmore process of plating have produced coatings that may be controlled as to thickness and that are exceptionally adherent and able to withstand severe drawing and forming.

"Nickelply," the registered trade name for the nickel-coated material, is produced by the improved Kenmore process. The company acquired rights to the process—formerly termed "Fernicklon"—last year, and has concentrated extensive research, development and production facilities on perfecting the material and assisting customers in engineering new applications.

Drawn After Plating

Using as base metal high carbon, low carbon or alloy steels (copper alloys can also take a nickel deposit) a uniform coat is electrodeposited directly on rod, wire or tubing. The material is then drawn by conventional methods to finished size. Indicating the nickel deposit's ductility is lack of coating rupture after reductions in area as high as 90 per cent without intermediate annealing.

★ ★ ★

Extreme flexibility of the process makes possible coatings of up to 10 per cent nickel within exceedingly narrow tolerances, even in thin coatings. Commercial sizes are supplied in the range from 0.010-inch to 0.310-inch, depending on tensile requirements.

★ ★ ★

Nickelply is furnished in either matte or super-bright finish, depending on processing requirements. Using the super-bright finish wire, subsequent finishing operations are seldom necessary. The matte finish has a residual

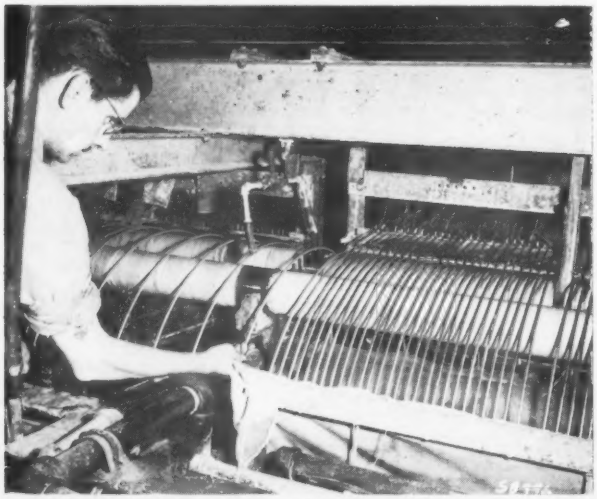


Fig. 1—Key to uniformity of the coating lies in feeding the wire through the cleaning and plating tanks in a continuous spiral. Support rollers (center) rotate at a speed synchronized with the speed of the wire drive rolls. Wire is spaced at about ¾-inch, depending on size. Instruments indicate the amount of current used and temperature of the various baths.

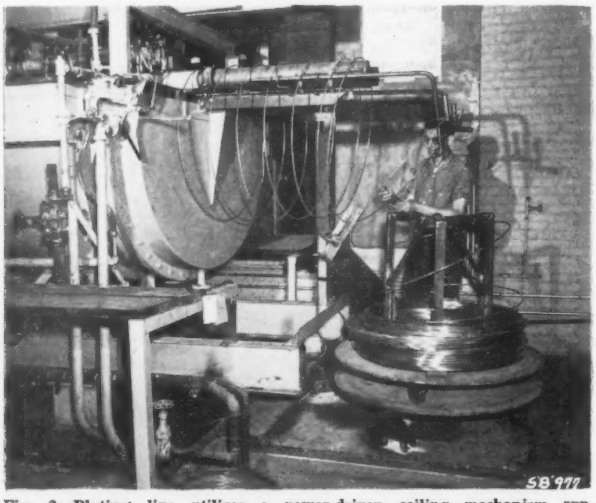


Fig. 2—Plating line utilizes a power-driven coiling mechanism synchronized with the speed of the plating unit to collect wire continuously. Micrometer is used for spot-checking diameter of the plated wire.

surface lubricant useful in some forming operations, and can be brought to a high luster by tumbling or burnishing.

Broad Choice of Physical Properties

The material offers designers a broad range of tensile strengths—depending on the base metal and diameter—plus nickel's excellent corrosion resistance. Wire products formed of Nickelply need no further plating. After drawing, the wire can be annealed, shaped and worked without chipping or flaking of the coating. Such operations as bending, flattening, swaging—even thread rolling—are possible. The material can be spot welded and butt welded with caution. The key lies in properly controlling the time cycle so that welding time is sufficiently brief. Thus corrosion resistance at the joint equal to the rest of the wire is maintained.

Where Nickelply is Used

Applications for Nickelply wire encompass a variety of electrical and electronic parts and other components where combinations of strength, corrosion resistance and lustrous finish are desirable. Examples are switching mechanisms for electric ranges, electronic tube grid supports, toaster guards, automotive head light wire, lead or hookup wire and switches.

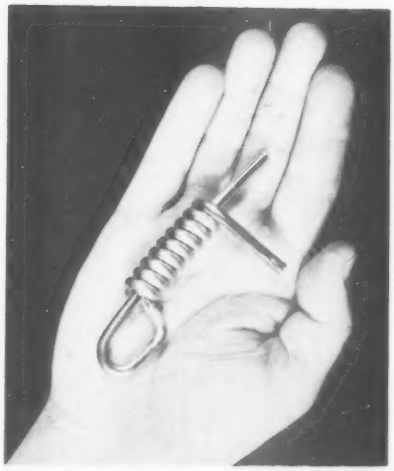


Fig. 4—Twisted wire indicates severe twisting and deformation which can be withstood successfully. To obtain the fine-grained, ductile coatings necessary for drawing without flaking, each phase of the cleaning-plating cycle must be carefully controlled.

It has been used to replace stainless steel in automobile radio antennas, indoor television antennas and other products where a decorative finish coupled with resistance to tarnishing is desirable. Other typical products using the nickel coated steel wire include lamp frame wire, wire conveyor belting, processing baskets, closet hardware, toys, coat hangers, and similar products.

The Spiral Plating Process

To obtain the fine-grained, ductile coatings necessary for drawing without flaking, each phase of the cleaning and plating cycle must be carefully controlled. Feeding the wire through the cleaning and plating tanks in a continuous spiral is the key to uniformity of the coating.

★ ★ ★

In the processing operation, hot-rolled rod or wire first passes through a wire die of slightly smaller diameter, through pinch rolls for driving and then to straighteners and coil formers which impart the proper cast and pitch, forming a large helical spring.

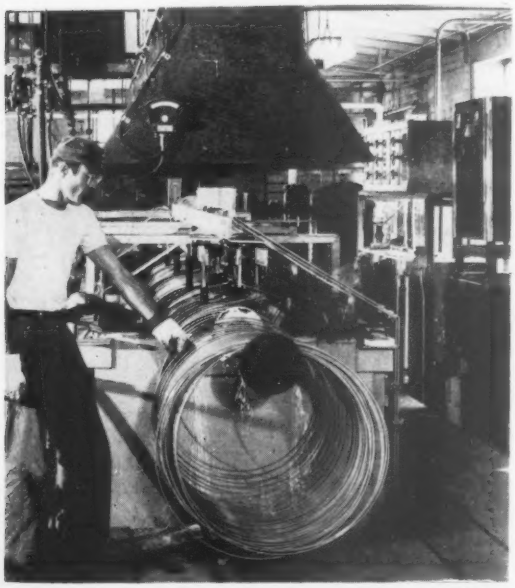
★ ★ ★

The wire in this form is then continuously transferred to a slowly-rotating horizontal support roller which transports the wire through the cleaning and plating cycle. This support roller rotates at a speed synchronized with the speed of the wire drive rolls, moving it through the baths at a spacing of about ¾-inch, depending on the wire's size. Because of this spiral progression, the wire passes in and out of the baths **several hundred times** during the cleaning-plating cycle. Instruments indicate the amount of current used and temperatures of the various baths.

★ ★ ★

On the take-up end of the line, the plated material accumulates and is cut off when a coil of the

(*Please turn to page* 217)



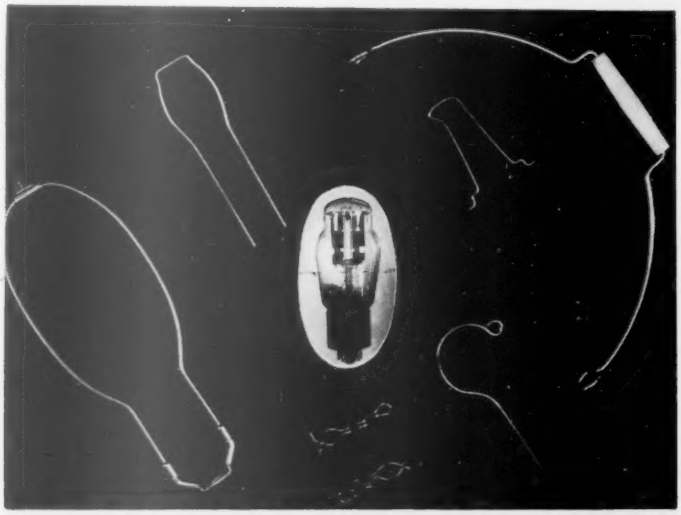


Fig. 5 (above)—Typical Nickelply wire parts: Lamp frames, electronic tube grid supports, closet hardware, handles.

Fig. 3 (left)—Nickel-coated steel wire accumulates at end of this plating line. It will be cut off when a coil of the desired weight collects.

New Developments in Silicone Rubber Compounds for Extruded Electrical Insulation

by Maynard G. Noble
Application Engineer
Silicone Products Department
General Electric Company
Waterford, New York

A paper presented at the Fifth Annual Wire and Cable Symposium of The Signal Corps at Asbury Park, N. J., on December 5, 1956.

The wire industry is continually on the look-out for the "all-purpose" insulation. Our only comment on this subject is: "Keep looking—silicone rubber does not fit that description!" However, silicone rubber is finding increasing acceptance as an insulation material.

* * *

There have been several papers presented in the past covering applications for extruded silicones. Consequently, any detailed discussion of usage areas would run the risk of being repetitious. We shall limit this phase of our paper to a brief summary of major applications to illustrate certain areas in which silicone rubber is currently active. The major portion of the paper will cover recent developments in silicone rubber technology and, also, some fundamental data on physical and electrical properties.

TABLE I

Typical Extruded Insulation Applications

Shipboard Cable
Ignition Cable
Aircraft Wire
Hook-Up Wire
Motor Lead Wire
Heater Wire
Fixture Wire
Power Cable

Military applications—shipboard cable, ignition cable, aircraft wire, and hook-up wire—still account for the largest volume of extruded insulation. The military has been offered a combination of desirable features, including improved performance, greater safety and—in some instances—lower cost. These factors have resulted in a steady increase in the number of wire constructions being designed around the properties of silicone rubber.

* * *

However, a glance at Table I will show that civilian applications are also increasing in number. The higher material cost of silicone rubber has been a greater deterrent in the extremely competitive commercial fields. Yet design engineers are turning to silicone rubber for many reasons, some of which are itemized in Table II.

TABLE II

Reasons for Expanded Usage of Silicone Rubber

1. Other materials are unsuitable because of operating conditions.
2. Re-design offsets differences in material costs.
3. Cost is lower than for alternative high temperature insulating materials.
4. Longer service life, improved performance and reduced maintenance justifies higher priced, higher quality product.
5. There is a downward trend in prices.
6. Compounds with improved properties have been developed.
7. Design engineers have obtained greater knowledge of inherent properties.

We are seeing trends towards ever-increasing operating temperatures, frequently combined with low temperature flexibility requirements. These trends are accentuated by the current emphasis on such factors as higher speeds in aircraft, miniaturization programs and—in commercial power cable—increasing service loads while conduit capacity is limited by space considerations.

* * *

The best illustration of the influence of re-design is shipboard cable where reductions in diameter and weight resulted in the development of silicone rubber insulated cables which were equivalent in cost to cable designs previously used. These savings in space and weight, combined with the additional benefit of improved performance under disaster conditions, led to the wide spread adoption of silicone rubber for shipboard insulation.

* * *

Fluorinated materials also possess high temperature stability and are used for many insulating purposes. Silicone rubber can occasionally be used interchangeably with these materials with a consequent lower ingredient cost.

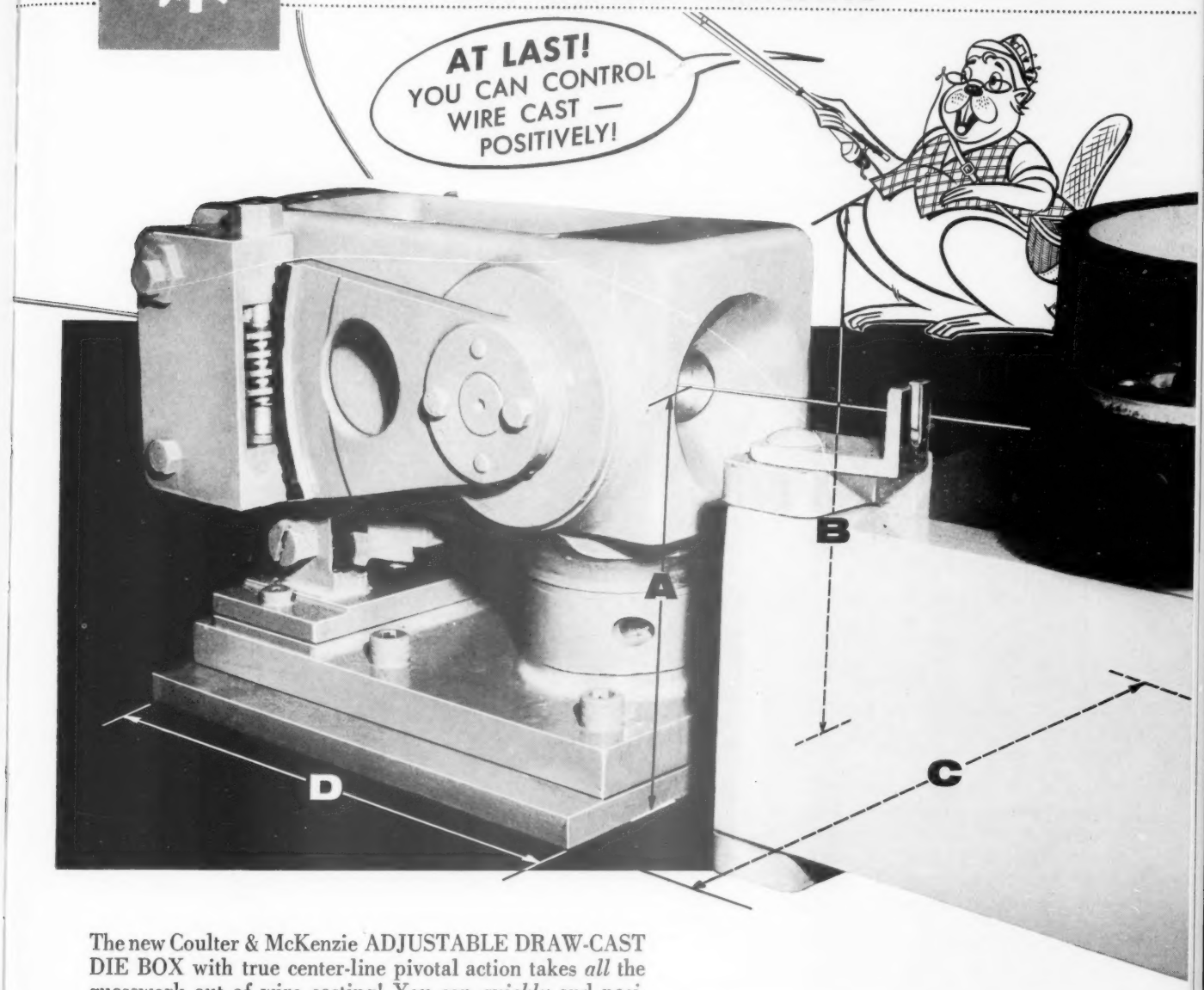
* * *

Outstanding aging, weathering, ozone and corona resistance have been translated into longer service life and improved performance. As a result, markets have been opened where other materials were used previously. One illustration is the increasing use of silicone rubber as lead wire for Class B motors.

* * *

The trend in silicone rubber prices is downward and each successive drop has opened a little wider the door to expanded applications.

ADJUSTABLE DRAW-CAST DIE BOX
FOR WET OR DRY DRAWING



The new Coulter & McKenzie ADJUSTABLE DRAW-CAST DIE BOX with true center-line pivotal action takes *all* the guesswork out of wire casting! You can *quickly* and *positively* establish the desired loop diameter and pitch of your wire with just 2 simple adjustments.

LOOK AT THESE ADVANTAGES:

1. Positive Adjustable Control of cast and pitch.
2. Completely eliminates or greatly reduces skilled use of casting rolls.
3. Positive locking of controls and die insures uniform constant cast, coil after coil.
4. Graduated indication permits keeping records for quality control and duplication when changing sizes or analysis.
5. Easy to install on most types of wire drawing equipment.

MODEL NO.	MAX. DIE SIZE CASING O.D.	NET WEIGHT	DIMENSIONS			
			A	B	C	D
1	1"	8 lbs.	2 5/8"	4"	6"	4 1/2"
2	1 1/2"	14 lbs.	2 7/8"	4 1/2"	6 1/2"	5"
3	2"	125 lbs.	7 1/4"	10 1/2"	9 1/2"	12 1/2"

Model No. 3 (Illustrated) may be arranged for direct water cooling of die casing.

U.S. and foreign patents applied for.

Patent No. 2,732,060—other U. S. and foreign patents pending.

771 WATER STREET
OPPOSITE RAILROAD STATION

THE COULTER & McKENZIE MACHINE CO., INC.
BRIDGEPORT 3 CONNECTICUT U S A

TELEPHONE EDISON 5-1101
LIEBER'S CODE "MACKENZIE"

SINCE 1942 INCORPORATED 1951

We would like to devote the bulk of our paper to an expansion of items six and seven in Table II. We believe cable engineers will be interested in a brief review of significant improvements that have been made in silicone rubber compounds. We would also like to present illustrations of the type of data being obtained for the benefit of engineers in designing suitable cable applications.

Development of Improved Compounds

Improvements in compounds have resulted from developments in various fields:

1. New polymers
2. New fillers
3. New vulcanizing agents
4. New processing techniques

Influence of Polymer Development

The polymer is the most important factor in determining over-all performance of silicone rubber compounds. The polymer is responsible for such fundamental properties as heat resistance, low temperature flexibility, corona and ozone resistance, etc.

★ ★ ★

Recent developments have seen improvements in the basic polymers as the result of changes in composition and/or polymerization and processing techniques. Typified by General Electric's SE-33 silicone rubber gum, these new polymers have resulted in compounds possessing improvements in such qualities as reduced shrinkage during oven curing, reduced compression set when subjected to loads at elevated temperatures, and improved physical properties. New polymers have made possible the development of conducting silicone rubber compounds. New polymers have contributed improved handling qualities to the uncured silicone rubber compound, have reduced oven curing cycles, and have made new vulcanization techniques possible. These improvements have been obtained without sacrifice in fundamental characteristics possessed by silicone rubber compounds.

Influence of Filler Development

Filler manufacturers have also been active in recent years. Today we have a much wider range of available materials from which to choose. A number of such products are listed in Table III.

TABLE III

Typical Fillers for Extruded Insulation Compounds

Filler	Supplier
Santocel CS	Monsanto Chemical Co.
Cab-o-sil	Godfrey L. Cabot
Valron	E. I. duPont
Whitetex Clay	Southern Clays
Titanox RA	Titanium Pigment
Diatomaceous Earths	Johns-Manville and Dicalite Division Great Lakes Carbon Corp.

In the finished compounds, fillers influence:

1. Physical properties
2. Electrical properties
3. Heat resistance
4. Resistance to water absorption
5. Processing qualities

Filler developments have resulted in new compounds possessing appreciably improved physical properties. Compounds currently available represent significant increases in such important features as tensile strength, elongation, and tear strength. We will go into greater detail on these properties in a few moments.

★ ★ ★

There have been outstanding improvements in electrical properties. The development of such fillers as fumed silica, typified by Godfrey L. Cabot's Cab-o-sil, has resulted in a ten-fold increase in insulation resistance coupled with lower dielectric constant and power factor values. Low water absorption has led to stability in electrical properties even when subjected to prolonged water immersion.

★ ★ ★

Heat resistance has been extended by proper filler selection. Compounds are available which show very little change in physical properties after six months aging at 150C. (See Table VIII.) Flexibility can be maintained even after six months exposure at temperatures as high as 210C (see Table IX) and for shorter periods of time at a temperature of 315C.

★ ★ ★

Processing qualities have been improved. New fillers and polymer combinations have yielded compounds with greater strength in the uncured state. This characteristic reflects itself in better handling qualities on the rubber mill during freshening and in the tuber during extrusion. Flow qualities have been improved and have permitted the extrusion of thin wall insulation. Surface qualities are better and shelf stability of the uncured compound has been extended. However in the over-all field of processing qualities we realize there is room for still greater improvement.

Influence of New Vulcanizing Agents

Benzoyl peroxide has long been the main vulcanizing agent used with silicone rubber compounds. It is an excellent curing agent for extrusion applications where the fabricated part is to be cured under steam pressure.

★ ★ ★

Recently developed curing agents, such as bis(2,4-dichlorobenzoyl) peroxide, dicumyl peroxide, and ditertiary butyl peroxide, have opened the door to new and improved processing techniques. It is now possible to cure silicone rubber insulated wire by the continuous hot air process, even in heavy wall thicknesses. The curing of conducting carbon black compounds has been made practical for production purposes. A much needed flexibility has been introduced into the processing of silicone rubber.

★ ★ ★

One point should be made clear: While these various improvements have been made, it has not yet been possible to incorporate all of them in a single compound. Careful selection is still needed to obtain the proper compound for a specific application.

Studies of Fundamental Properties

Considerable data have been collected over the past few years on

the fundamental properties of silicone rubber. This information has resulted from test programs conducted by material suppliers, wire and cable fabricators, and end-users. As a result of these data, design engineers have been given more of the tools necessary for the selection of proper applications for silicone rubber and the avoiding of misapplications where other insulating materials should be used.

★ ★ ★

We would like to take this opportunity to present some of the latest data that have been collected. In the General Electric Laboratory the majority of the data is based on tests run using standard ASTM slabs, cured as indicated in the separate sections. Where other type samples were used, this fact has been indicated accordingly. Figures reported are typical and should not be construed as minimum values.

Test Compounds

The data contained in this paper are based on three compounds, the compositions of which are listed in Table IV. We gave serious consideration to the masking of the products by using such designations as A, B, and C. We decided the data would have more significance to those engineers familiar with silicone rubber compounds if the regular designations were used.

TABLE IV

Composition of Test Compounds

	SE-972	81625	81686
Polymer	SE-76 Silicone Gum	SE-30 Silicone Gum	SE-33 Silicone Gum
Fillers	Diatomaceous Earth	Fumed Silica and Diatomaceous Earth	Fumed Silica
Curing Agent	Benzoyl Peroxide	Benzoyl Peroxide	Bis (2, 4 - dichlorobenzoyl) Peroxide

TABLE V

Typical Physical Properties After One Hour at 150C Cure

	SE-972	81625	81686
Durometer	65	60	65
Elongation, %	120	200	500
Tensile Strength, psi	650	900	1400
Tear Strength, pi	40	70	200

TABLE VI

Typical Physical Properties After 24 Hours at 150C Cure

	SE-972	81625	81686
Durometer	70	60	70
Elongation, %	100	200	450
Tensile Strength, psi	750	900	1400
Tear Strength, pi	45	70	165

TABLE VII

Typical Physical Properties After 24 Hours at 250C Cure

	SE-972	81625	81686
Durometer	75	65	80
Elongation, %	75	125	220
Tensile Strength, psi	800	750	900
Tear Strength, pi	50	70	110

SE-76 and SE-30 are methyl silicone polymers. The major difference is that compounds based on SE-30 have lower shrinkage characteristics than compounds based on SE-76. SE-33 is a low shrinkage methyl silicone polymer containing a small amount of unsaturation. The diatomaceous earth used in these compounds was Celite 350 produced by Johns-Manville; the fumed silica was Godfrey L. Cabot's Cab-o-sil.

Physical Properties

As the result of new gum and filler combinations, substantial increases in such properties as tensile strength, elongation, and tear strength have been achieved. Tables V, VI, and VII illustrate the improvements obtained.

★ ★ ★

It will be observed that compounds are now available which can be cured to give tensile strength values of 1200 to 1500 psi, elongation values of 400 to 600 per cent, and tear strengths of 150 to 200 pounds per inch. The latter compounds stand up well under the traditional "thumb-nail" test.

★ ★ ★

It should be noticed that physical properties are a function of curing temperature and time. The greatest improvements have been achieved in compounds when they have been cured at relatively low oven temperatures. These new compounds decrease in tensile strength, elongation, and tear strength with increasing oven cure temperature and oven curing times. However, even after 24 hr. at 250C, we find that new technology has contributed benefits in the form of higher retained values.

★ ★ ★

The question of the proper oven cure is one which must be related to the final end-use application. As a rule of thumb, it is wise to cure the wire at a temperature equal to or slightly above the maximum temperature to which it will be exposed in service. Except for highly specialized applications, a short exposure time—one to six hours—is all that is required.

★ ★ ★

In many wire applications, the insulation can complete its cure while in service. For these applications, the oven cure may be eliminated or confined to relatively low temperatures up to 150C. As a result, the maximum physical properties can be realized.

Effect of High Temperature Oven Aging

We have frequently encountered the question, "What is the maximum continuous service temperature for silicone rubber?" We wish the answer to that question were known. To the best of our knowledge, no one has this information.

★ ★ ★

Underwriters' Laboratories have

approved wire for service at 200C on the basis of retention of physical properties after 60 days at 210C oven aging. However, the electrical industry does not define "60 days" as "continuous."

★ ★ ★

We have tests in progress to learn the effect of long time exposure to 150 and 210C on physical properties. These tests have progressed for more than six months and will be continued for several years and longer where necessary. Results to date on our test compounds are given in Tables VIII and IX.

TABLE VIII

Effect of 150C Oven Aging

	81625			81686		
	Elong. (%)	Tens. Str. (psi)	Flex	Elong. (%)	Tens. Str. (psi)	Flex
1 Day at 150C	175	900	OK	450	1400	OK
1 Month at 150C	160	900	OK	275	1200	OK
2 Months at 150C	150	900	OK	275	1150	OK
4 Months at 150C	150	850	OK	- STILL IN PROGRESS -		
6 Months at 150C	150	850	OK	- STILL IN PROGRESS -		

TABLE IX

Effect of 210C Oven Aging

	81625			81686		
	Elong. (%)	Tens. Str. (psi)	Flex	Elong. (%)	Tens. Str. (psi)	Flex
1 Day at 210C	150	900	OK	325	1200	OK
1 Month at 210C	130	900	OK	200	950	OK
2 Months at 210C	130	950	OK	125	850	OK
4 Months at 210C	100	1000	OK	- STILL IN PROGRESS -		
6 Months at 210C	80	1100	OK	- STILL IN PROGRESS -		

TABLE X

Typical Electrical Properties After 24 Hrs/150C Cure

	SE-972	81625	81686
Volume Resistivity (ohm-cm)	5×10^{14}	1×10^{15}	1×10^{16}
Electric Strength (volts/mil)	500	500	500
Dielectric Constant (60 cps)	3.4	3.1	3.0
Power Factor, % (60 cps)	0.80	0.35	0.15

It can be seen that 81625 has demonstrated excellent stability at 150C. As would be expected, depreciation in properties has been accelerated by oven aging at 210C. However, there is appreciable elongation and very good flexibility still retained after the six months aging period.

★ ★ ★

Data on 81686 are very limited because this product is very new and has just recently been put into our test program. However, the two months aging data indicates this compound will not be equal to 81625 in over-all aging properties.

Electrical Properties

81686 represents a major step forward in physical properties. What has been the influence of this step on electrical characteristics? We are pleased to report that our tests indicate that there have been improvements in this area as well.

A. Fundamental Properties

In Table X we have listed fundamental electrical properties of our three test compounds. These properties were determined on ASTM slabs cured 24 hr/150C.

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It will be observed that volume resistivity has increased appreciably. The improvements in dielectric constant and power factor are also noteworthy.

B. Effect of Temperature on Volume Resistivity

The influence of temperature on volume resistivity has been covered several times in previous papers. It has been established that the volume resistivity of silicone rubber compounds will vary inversely with ambient temperature, as is typical with other insulating materials. The same trend has been observed with the newer formulations. As shown in Figure I, the volume resistivity decreases but insulating qualities are still retained even at a temperature of 250C.

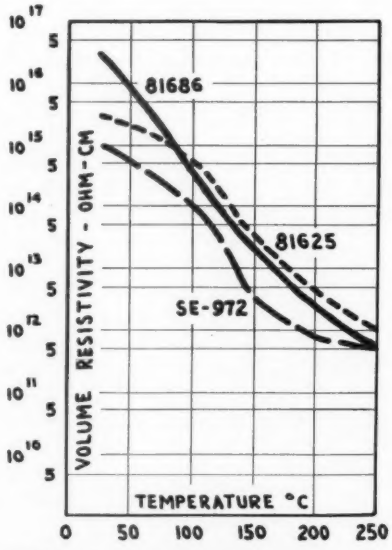

Fig. I - VOLUME RESISTIVITY vs TEMPERATURE

C. Effect of Water Immersion on Dielectric Constant and Power Factor

Figures II, III, IV and V illustrate the influence of prolonged water immersion on dielectric constant and power factor. It will be observed that all three compounds are showing very good stability after 60 days immersion both in room temperature and 70C water. These tests are being continued to determine the effect of longer immersion time.

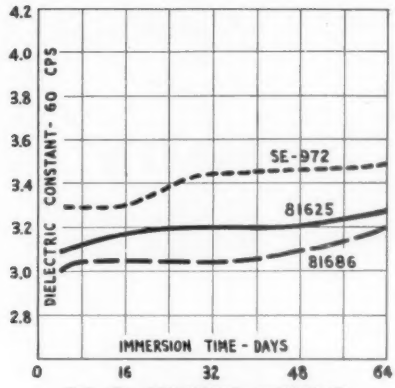

FIG. II - DIELECTRIC CONSTANT vs ROOM TEMP. (23°C) WATER IMMERSION

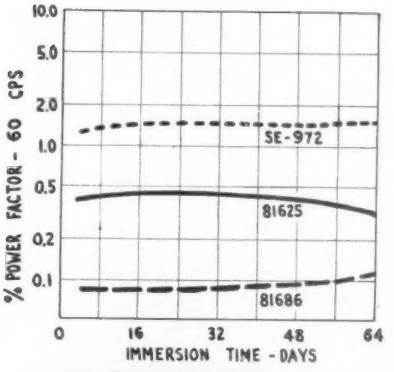

FIG. V - POWER FACTOR vs 70°C WATER IMMERSION

D. Electric Strength vs. Thickness

Design engineers must take into consideration the influence of the factor of thickness on electric strength. We have run tests on a number of compounds, including the specific ones covered in this paper. Test thicknesses have varied from 20 mils to 500 mils. Our conclusion has been that the electric strength in volts/mil decreases with thickness independently of the silicone rubber formulation. The drop-off in electric strength represents a smooth curve as illustrated in Figure VI.

E. Voltage Endurance Tests

We frequently encounter questions to which we do not have a ready answer. One such question has been raised recently: "It is recognized that the ozone resistance of silicone rubber at normal temperatures is excellent. However, what is the effect of high ambient temperature on ozone resistance?"

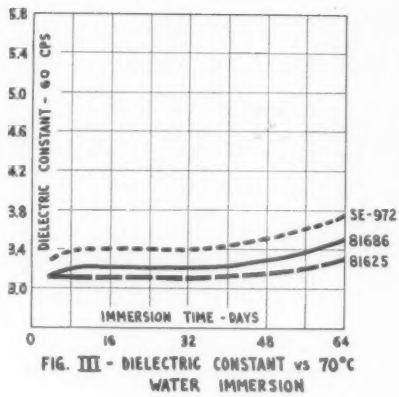

FIG. III - DIELECTRIC CONSTANT vs 70°C WATER IMMERSION

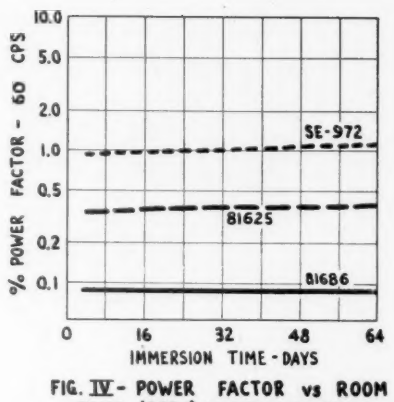

FIG. IV - POWER FACTOR vs ROOM TEMP. (23°C) WATER IMMERSION

* * *

It was decided that an answer to this question was extremely important. Consequently, a test program was initiated in our General Engineering Laboratories. While the program is not completed, we would like to make a preliminary report at this time.

* * *

The test specimens being used are short lengths of insulated wire. The construction consists of a #20 AWG copper conductor insulated to a nominal diameter of 0.120 inches with several different compounds.

* * *

The samples are wrapped helically around a 0.295 inch mandrel to subject the outer surface of the insulation to an elongation of approximately 25%. The wrapped samples are then inserted in 0.625 inch inner diameter stainless steel tubing and the supporting mandrels are removed. Steel tubing was selected because preliminary tests using 40-mesh screen electrodes resulted in too rapid removal of degradation products by the air circulating in the oven. More severe test conditions were desired.

* * *

Ceramic bushings are inserted into the ends of the tubing to prevent edge breakdown. Lead lengths of five inches are used to avoid flashovers at the elevated temperatures. The test assemblies are then placed in a high temperature oven and subjected to a potential of 10 kilovolts. This stress was selected since it represented about 50% of

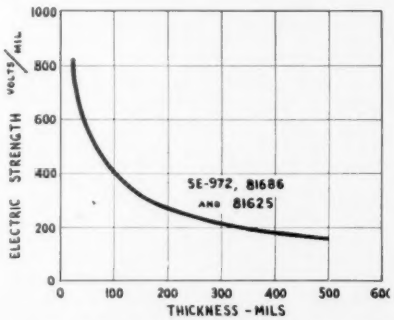

FIG. VI - ELECTRIC STRENGTH vs THICKNESS

the average breakdown voltage for the test specimens. See Figs. VII and VIII.

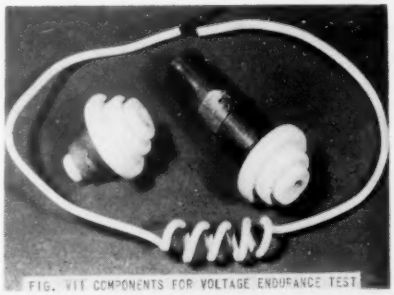

FIG. VII COMPONENTS FOR VOLTAGE ENDURANCE TEST

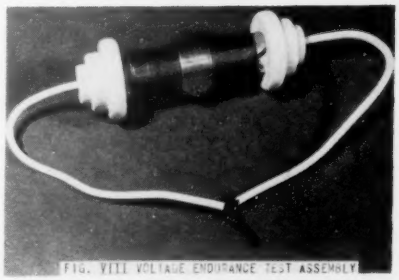

FIG. VIII VOLTAGE ENDURANCE TEST ASSEMBLY

At this time, our samples have been under test for 100 hours at a temperature of 250C. There have been no signs of corona erosion or stress cracking. The only observed change has been a progressive

(*Please turn to page* 216)

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How Some New Wire Processing Equipment Came into Being

by J. P. King, Vice President
The Alfred B. King Company
North Haven, Connecticut

This is an account of how observation and wire mill cooperation combined to develop new equipment that has cut costs and reduced manual labor.

One wintry afternoon a few years back, a group of our engineers were hotly debating—for the second day in a row—the abilities of various types of objects to withstand pressure. What must have sounded like a college class in theoretical physics actually had a highly practical purpose. We were out to design an annealing spider: a completely new, completely revolutionary, completely durable annealing spider . . . one that would not have to be replaced or repaired for years, if ever.

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Now, as every wire mill executive knows, that was a large order indeed. An annealing spider must be subjected to a terrific beating, hour after hour, day after day. Loaded with 5,000 pounds of wire or more, it undergoes a heating-and-cooling cycle of 11 or more hours in duration. Then, as it leaves the furnace, still at a temperature of 800 or 900 degrees Fahrenheit, there is still the wear and tear of the stripping operation ahead; after cooling, the spider must be flopped over on its side and upended to unload. After that, it's time to start all over again.

★ ★ ★

We knew all this. But we also knew that the KIF Industrial Fabrication Division of our company had been called upon by our wire mill customers to repair their warped and bent annealing spiders time and time again. We knew, too, that the standard spiders, even when in operating condition, had a serious tendency to become nicked and so to snag wire being unloaded; the resulting down-time was definitely costly. We also knew that standard spiders, despite our careful repairs, still had

J. P. King

to be completely replaced with short-term regularity; one wire mill in our area, operating three furnaces, was finding it necessary to replace 4 to 6 spiders a year—at an average cost of three hundred and fifty dollars.

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Most of all, we were bearing in mind that we had been asked by a leading wire mill to see what we could do to come up with a design for a spider . . . a spider that would take care of all headaches once and for all. That's the kind of challenge any industrial fabricator worth his salt will go all out to meet.

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It seemed to us that the place to start was to take a long hard look at the reasons why standard spiders lacked durability. The more we looked, the more we became convinced that their shape was wrong. Basically, they consisted of eight strips of steel held together and reinforced by a system of crisscrossing strips. Once any individual strip started to warp as a result of intensive heat, or heavy load, the whole structure would inevitably begin an accelerating process of deterioration. All right, then, so their shape was wrong! That conclusion brought us right to the big question. What was the right shape?

The Indestructible Cylinder

Our debates began. It's an engineering maxim, of course, that nothing is stronger under pressure than a cylindrical object. This property of the cylinder becomes even more marked when alternate heating and cooling must be carried out. When one side of a cylinder is heated and its metal expands the force of its expansion is perfectly balanced by the force exerted by the opposite side; the same principle, in reverse, applies during cooling. With this physical law as a base, our annealing spider began to take shape. It consisted of eight steel pipes evenly spaced in a circle around a central pipe of much larger diameter and welded to it. On our pilot model, the small pipes were 4 inches in diameter and the central pipe 10″ in diameter; all pipes, of course, were steel. The spider stood 81 inches high, large enough to take a heavy load, and its overall diameter was 20 inches. While the pilot model possessed a solid bottom plate, we recognized that if the spider worked out well the bottom plate could very easily be made removable, as some wire mills might prefer. Similarly, the overall diameter of 20 inches could be varied upward or down-

ward to any width required—simply by changing the size of the central pipe and the eight surrounding pipes.

★ ★ ★

We were hopeful, too, of adding two other important properties that we believed the "all-cylinder" spider would possess. Since all the pipes used in its construction were hollow, they would serve as ideal gas passages and so facilitate the heating and cooling process encountered. Equally important, since a cylinder has no corners, we reasoned from this that the operation of stripping wire could be carried out with a greatly reduced possibility of wire snagging.

★ ★ ★

The day came when we delivered our pilot model to **The Gilbert and Bennett Manufacturing Company,** Georgetown, Conn., and kept our fingers crossed to await the results. We were confident, sure—but every operating executive is aware of that big question mark between theory and the results attained in actual operation.

The Returns Arrived

Obviously, our wait to appraise the performance of the new annealing spider would have to be long. Weeks and months would have to go by before we could know that the cylinder had really lived up to the advance billing we had given it. Well today, seven years later, the returns are all in—and we are quite frankly very pleased with them. Since the original pilot model was built, more than 150 of these spiders have gone into service. And in all that time, not one has ever required replacement or even repair.

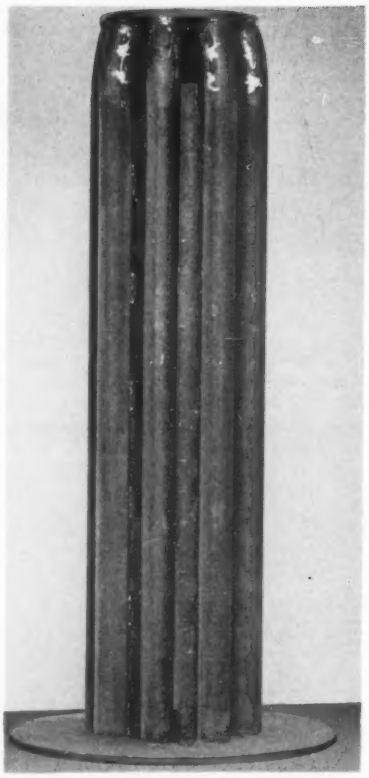

Fig. 1—The Tubular Spider.

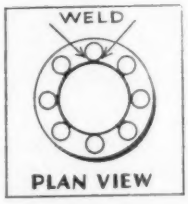

Fig. 2—

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We've had some surprises, but they have all been favorable. The new design of spider has lasted and lasted . . . that was expected. It has been almost impervious to nicks . . . that was expected, because it doesn't have those trouble-making corners. It has proved far easier to strip and so slashed down-time as a result of snagging . . . that was expected. It has completely eliminated the necessity for sandblasting or pickling every 3 or 4 months that standard spiders undergo . . . that, too, was expected. But we didn't expect that an ingenious operator at **The Atlantic Wire Company,** Branford, Connecticut, would go us one better. What did he do? Well, all he did was to cut 16 openings in the central pipe and thus made it possible to load the spider with up to 16 coils, all placed neatly in the "single-stacking" operation. We didn't expect, either, that the spider would spawn little offspring, but it did.

Spiders, Jr., Make Their Appearance

As the years passed, more and

(*Please turn to page* 218)

Fig. 3—Portable flipper being loaded with coils of butt-welded rod for transportation to the drawing machines. Note removable carrier plate at the top of the list on the truck.

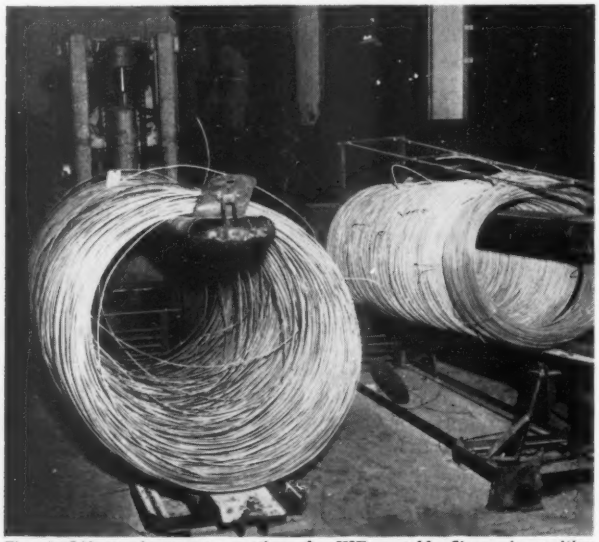


Fig. 4—Lift truck operator setting the KIF portable flipper in position at the wire drawing machine.

Preventive Maintenance of Modern Plant Instruments

by Leo Walter
Consulting Engineer
Eastcombe, England

The author discusses plant instrument maintenance, an increasingly important consideration in view of the growing use of new machines and apparatus that are equipped with elaborate measuring, controlling and recording instruments. As the trend toward automation increases, instruments must be maintained in good working order to assure accuracy and economy of operation.

Preventive maintenance in any plant requires a routine of regular inspection and overhaul according to a predetermined carefully worked out time schedule. This applies to instruments as used in wiredrawing operations just as much as it does to the machinery and plant buildings. Though details of organization depend on local conditions, such as size of works, methods of processing, age of instruments used, type of maintenance staff available, and on other imponderabilities, the basic principle is to find out the condition of each plant instrument regularly. Instrumentation in wire-drawing plants has made great progress in recent years, and many other instrument types have now become obsolete. In addition to measuring instruments a number of automatic regulators operate today in modern works, and automatic process control, as forerunner of partial automation has become standard. Electronic valves can be found in automatic control of speed in very elaborate electronic speed drives, and for electronic control of many process variables. Modern furnaces employ electronic pyrometer controllers of great responsivity and accuracy. There is scarcely a works' department where electronic control is not either existent, or will soon find its way in.

★ ★ ★

The increase in the use of electric and electronic automatic controllers makes it imperative for the works engineer to devote more thought to proper instrument maintenance. In order to obtain the expected benefits from controllers for pressure, temperature, liquid level, rate of flow etc., the control instruments must obviously be reliable. A failure of a single control instrument may derange work efficiency if undetected.

★ ★ ★

Even a well-designed and correctly fitted control instrument is bound to fail if not checked and serviced after a certain time of duty. Fixing and maintenance instructions, supplied by the makers of control instruments, usually set out in great detail how servicing should be done. In practice, the first part, dealing with installation, is generally read, but the second part, setting out maintenance work, is more often than not overlooked by the workspeople, with unfortunate results.

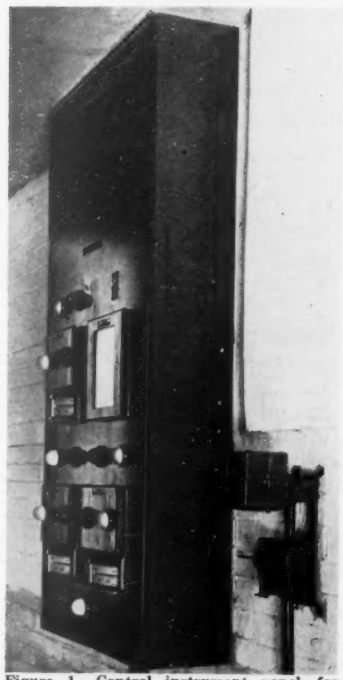
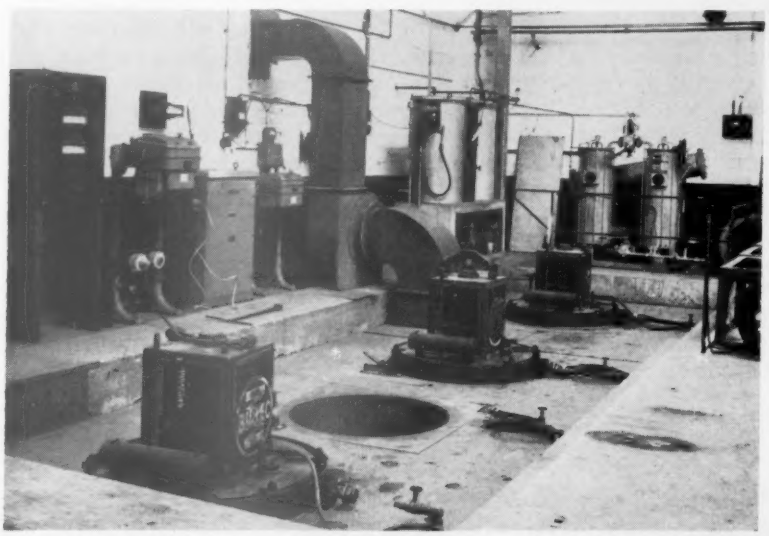


Figure 1.—Control instrument panel for wire patenting furnace.

Preventive Maintenance

Knowledge of instrument design and performance can be acquired the hard way, namely by trial and



Three pit furnaces used for heat treatment of carbon steel wire. Instrument with cubicle on left.

error methods. This is likely to be costly, and should be avoided. Lack of specialized knowledge often produces shyness to handle automatic control instruments in the works. It may sometimes even lead to regarding a controller mechanism as a box of tricks—better left alone as long as possible, e.g. until the controller breaks down or control becomes erratic. The engineer who knows his instruments and their basic design elements, and has read carefully instructions from the makers, will adopt a more sensible attitude, namely, preventive maintenance.

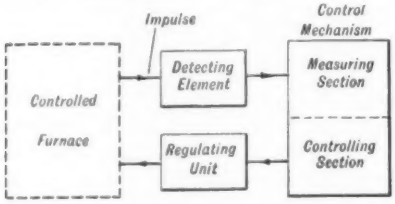


Figure 2.—Study of basic control components of control systems in use. * * * * *

Lack of knowledge of the basic facts of automatic control can sometimes be attributed to lack of time to go deeper into the matter. After all, the biggest responsibility of the works engineer is the overall high efficiency of the plant, good output at lowest cost, and reliability of processing. Scarcity of technical books written on the not too easy subject of automatic process control in a language which the practical engineer can understand may contribute to a certain ignorance regarding preventive maintenance of controllers. The usual result is the absence of a scheme whereby each instrument in a works is regularly inspected, cleaned and tested. Lack of such a scheme will often lead to a breakdown of a controller, which would not have occurred under preventive maintenance, and, as before stressed, the breakdown of a controller may have results in the spoiling of materials and the holding up of production that would be far more costly than any amount likely to be spent on maintenance.

Use of Correct Controller Type

There is however, another reason for trouble with controllers, namely, overload of an instrument

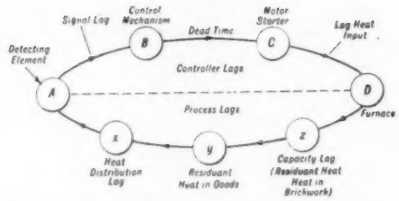


Figure 3.—Know furnace time lags before you pick out a controller that is suitable. * * *

which has not been designed for the heavy duty it is asked to perform. Maybe cooperation between maker and user of the controller was not as close as desirable at the time when the equipment was chosen. The instrument operates under a constant strain and is exposed to frequent over-loads, under which it ultimately breaks down or stops accurate control, with resulting erratic performance.

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Lack of correct adjustment or re-adjustment of the controller mechanism may also be responsible for trouble. Controller characteristics and process characteristics must mate in order to obtain the desired result. The latter depends, however, on actual working conditions, which may change. The instrument may start to control erratically simply because working conditions have changed; it may work under a greater strain than usual until it breaks down.

★ ★ ★

The circumstances in which external causes produce controller breakdowns are numerous. Knowledge of the fundamentals of automatic control will, however, enable the works engineer to look at his plant from time to time with common sense, which is really all that is required for the investigation of control troubles. The knowledge of process time-lags, of process reaction rate, and of other process characteristics can be acquired by carrying out certain tests with hand control. If equipment works well with manual control, it should work better with automatics.

Sources of Trouble

The experienced works engineer will not hesitate to open a controller mechanism where it can be expected that minor repairs or readjustments can cure trouble.

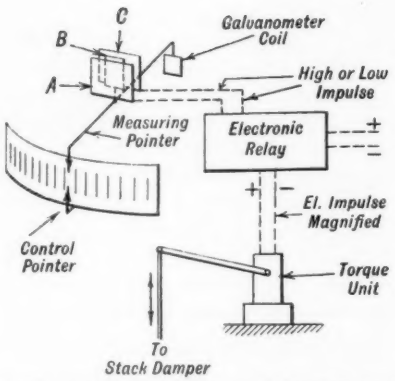

Figure 4.—Electronic relays. Friction-free control movement of flapper B between coils A and B produces no trouble if torque unit is well maintained. * * * * * * *

Minor deformation of levers and of gear in general can often be put right within the mechanism without taking the controller off duty. Springs may have developed "Fatigue" and must be replaced. A worn-out pivot may have to be ground in. Dead movement of the transmission within a mechanism may have to be corrected by readjustment of levers. Numerous minor causes of trouble can thus be put right without sending the instrument back to the makers.

★ ★ ★

As is well-known in instruments the purpose of an electronic tube or valve, similar to those used in a wireless set, is to magnify an electric impulse. An electronic tube thus acts as a very accurate magnifier and electric relay, and works without noticeable time lag. For electric measurement this has considerable advantages, and even more for automatic process control because it cuts out mechanical moving parts, such as galvanometers, slide wires, etc.

Figure 5.—Optical pyrometer in use on an industrial furnace. Study maintenance instructions from the makers to obtain best results. * *

In many electronic control systems an electronic relay produces electric current for actuating a motorized control valve. Servicing has thus become easy because very few moving parts are present compared with the need to service mechanical linkwork, etc., in a mechanically operated control mechanism. A faulty tube can often be simply replaced by using a spare tube from stock and by plugging same in.

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When dealing with preventive maintenance of electric instruments in general, it must be assumed that the reader has a basic knowledge of electric measurement, of wiring circuits, and of the fundamentals of electronics. Many excellent mechanical engineers in charge of works operation depend more or less on specialised electricians for dealings with electrical plant and electrical control gear. This produces a certain shyness on the part of plant engineers with purely mechnical background to service electric or electronic instruments, although maintenance of the latter can be exceedingly simple. There are, however, many means to get instruments properly serviced. The best method to ensure preventive instrument maintenance where skilled people are scarce is to place a servicing contract with a reputable firm of instrument makers. Many prominent instrument makers provide this service for a moderate fee.

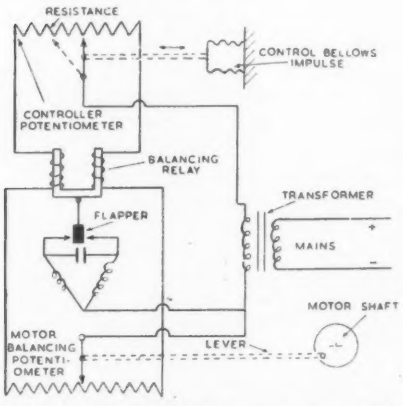

Figure 6.—Simple wiring diagrams allows study of function of potentiometer control with slide-wire resistance actuating modulating valve motor.

A Few Practical Hints

A properly designed wiring diagram can be invaluable for trouble-shooting, and so can notes taken by the staff during installation of more elaborate instrument panels. Parts lists of standard repair parts also are a great help for servicing.

★ ★ ★

The history of each instrument must be known and for this purpose a card index has to be established which gives all relevant data at a glance. Cross-indexing is often advisable, so that one set of cards is classified according to type of instrument and another according to the plant equipment to which instruments are fitted. Both sets have to be kept up-to-date, a duty which can only be arranged in relationship to the organization of the particular works.

★ ★ ★

Compilation of the index in the first place may be a big job but once the foundations have been laid it is only a matter of routine to keep it going.

★ ★ ★

An indispensable addition is a collection of classified folders containing literature, leaflets, catalogues and fixing and maintenance instructions for each instrument. It is sometimes advisable to split up this folder into two sections; one for leaflets and catalogues and the other for fixing and maintenance instructions from the makers, containing additional notes from the maintenance staff derived from practical experience.

★ ★ ★

Each card of the instrument index contains information on the type of instrument, its construction and working, references to descriptive matter in the appropriate folder, the maker's name and address, instrument and type numbers, the date of purchase with particulars such as time of delivery, price, weight and main dimensions, notes on special features and so on.

★ ★ ★

On the back of each card the procedure of planned maintenance is set out.

★ ★ ★

Details are best decided in consultation with the makers and in the light of experience within the plant.

★ ★ ★

Beneath these top instructions is a ruled space for information to be entered regularly, giving the dates of inspection, cleaning, testing, recalibration, repairs and so on.

★ ★ ★

The card notes vary according to circumstances. Where in doubt the instrument maker should be consulted before putting a schedule into practice. The effort needed to create maintenance is quite considerable, but so are the benefits. In any case, the effort of compiling data as the result of a detailed survey of plant instruments is much smaller than the efforts for dealing with broken-down instruments during the years. It has been proved that the immediate financial success of a scheme which prevents instruments deteriorating cannot be doubted.

★ ★ ★

Index cards for electrical instrument installations can be based on similar considerations as mentioned for mechanical instruments, but the design of electrical components makes addition of several electric items for servicing advisable. For example, contact condition during inspection, shunts, coils, overload, relays, resistors, compensating wires of thermocouples, contact boxes, and the like. In order to make sure that the record on wiring is instructive, it may be that sketches or blueprints should be kept separately filed in addition to the card index with appropriate reference on the latter where to find them.

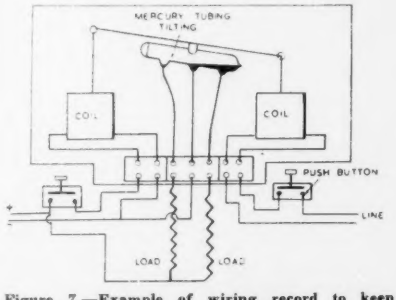

Figure 7.—Example of wiring record to keep filed for switch relay (push-button).

First thing to observe when

servicing electric instruments, and electric gear such as relays, is to make sure that supply lines are bead, except when actually testing under working conditions. Cables must remain safely disconnected, and then the instrument can be opened. The main enemies of proper working are again dirt and dust, humidity, fumes, heat, oil, vibration, exposed location to mechanical damage, and the like. Thus it is obvious that correct installation is already part and parcel of preventive maintenance. The methods of cleaning vary. Sometimes a dry brush can be used, sometimes compressed air will blow out dirt particles. Other parts have to be dismantled and dipped into a cleaning solution followed by careful drying. Checking of terminals, shunts, coils, springs and wiring follow the usual routine, familiar to any skilled electrician.

★ ★ ★

One of the fundamental service operations is keeping electric contacts in good working order. Wherever contact surfaces show signs of burning, pitting, or of excessive wear, they have to be put right. Sometimes a microscope might disclose faults which cannot be detected by the naked eyes. For flattening open contacts only a very fine file or very fine emery cloth should be used in certain instances, but not for silver contacts. The use of hermetically sealed contacts, especially of vacuum mercury tubes, obviates servicing. An important point is sometimes spring pressure of contacts, which has to be checked and adjusted. Servicing of instrument coils, dash pots, synchronous motors for driving record charts, or electric relays, follows the usual routine.

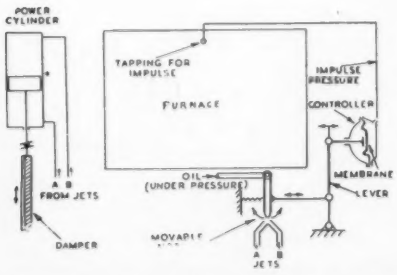

Figure 8.—Simple oil-set control scheme produces average control accuracy for draft regulation. High accuracy demands would require elaborate additional feed back. * * * * * *

Accuracy of Control

While the choice of control methods is mainly the job of the control expert, the user generally has to state at which accuracy he wishes to perform control. Caution has to be exercised by the potential user of control mechanisms before expressing his requirements. First, accuracy of control depends not on what the user of a control mechanism wishes to obtain, but on what the process will allow. In other words, the user must know the degree of controllability of his process and keep within these limits when stating his claims for accuracy.

★ ★ ★

Secondly accuracy of control is obviously closely related to financial considerations, because in general the greater the required accuracy, the more elaborate becomes the control mechanism, and first cost maintenance expenditures rise accordingly.

★ ★ ★

If the user is willing to tolerate moderate accuracy, i.e. certain deviations of the controlled variable from the set point, the choice of simple control instruments is possible, and they are easier to maintain. Generally speaking, where process load and the supply of the controlling medium are fairly steady, and where the duration of a process is rather prolonged, simple controller types can be used, provided that only moderate accuracy of control is required.

Care of Instrumentation

An instrument department can be made part of the operating department, or of the department for general maintenance. The former is to be preferred because production and instrumentation are closely interconnected. The operatives concerned with instruments must know how a new instrument works, and be familiar with methods of adapting it to process conditions by adjustment or re-adjustment, and with its maintenance in efficient working order. Knowledge of instruments can be gained by dissemination of information on instrument engineering by:

(a) Careful study of makers' literature before ordering a new instrument.

(b) Discussion of every measuring or controlling problem with an instrument expert.

(c) Study of fixing and maintenance instruction of each new instrument from start to finish, before the instrument is fitted.

(d) Studying periodicals, papers, and books which will give a fundamental knowledge of the theory and practice of measurement and control.

(e) Attendance at lectures, instruction courses, exhibitions, and industrial fairs.

(f) Visits to makers' works to acquire firsthand knowledge from the people who calculate, design, and make the instruments.

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It might be advisable to send an assistant, foreman, or fitter for a week or a fortnight to an instrument maker to be trained in adjustments and maintenance of those instruments which are in use at a works. There are optimum settings of controllers, which it should be known how to achieve. There is the choice of the most suitable location for pressure tapings, thermometers, thermostat bulbs, thermocouples, and orifices, upon which the makers' head fitter would advise.

★ ★ ★

The ability of a trained instrument man to diagnose trouble quickly without a great deal of wasted time will make fruitful this training period in a specialised instrument workshop. Until a few years ago, few educational facilities have been available for familiarising engineers with instrumentation. Neither colleges nor universities had a special chair for instruments, or specialised courses for students. The older generation of technicians had to acquire the necessary theoretical knowledge by study in their spare time, and from practical experience.

★ ★ ★

Things have changed for the better since the war. Big firms have also established apprenticeships for instrument engineers for their own works under skilled guidance.

Blaming the Instrument is Often Wrong

If trouble arises in a process, the instruments are often blamed by the plant operator. It may be,

(*Please turn to page* 220)

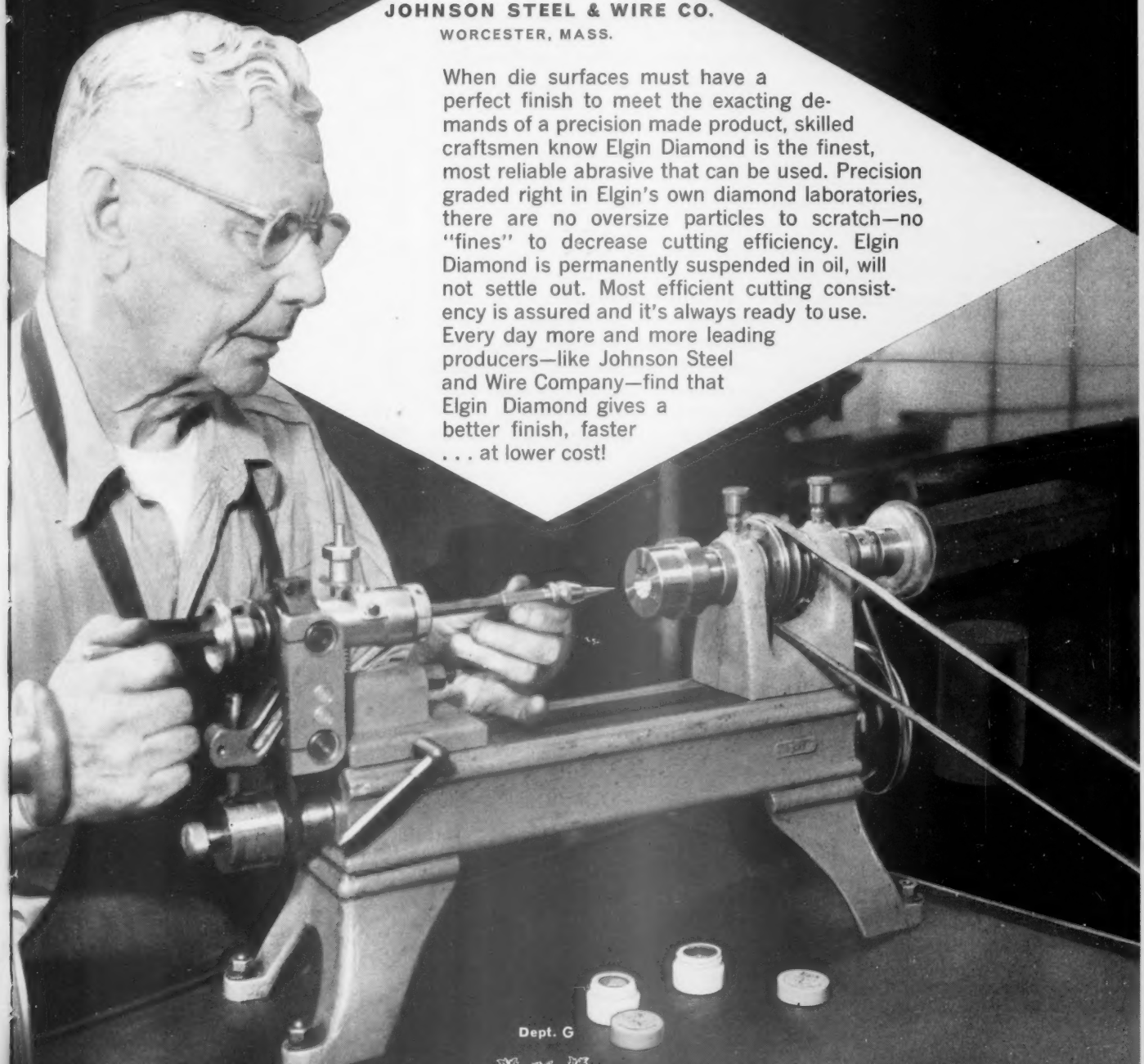
Fine Craftsmanship begins with

ELGIN DIAMOND

AT

JOHNSON STEEL & WIRE CO.
WORCESTER, MASS.

When die surfaces must have a perfect finish to meet the exacting demands of a precision made product, skilled craftsmen know Elgin Diamond is the finest, most reliable abrasive that can be used. Precision graded right in Elgin's own diamond laboratories, there are no oversize particles to scratch—no "fines" to decrease cutting efficiency. Elgin Diamond is permanently suspended in oil, will not settle out. Most efficient cutting consistency is assured and it's always ready to use. Every day more and more leading producers—like Johnson Steel and Wire Company—find that Elgin Diamond gives a better finish, faster . . . at lower cost!



Dept. G

ABRASIVES DIVISION

ELGIN NATIONAL WATCH COMPANY

ELGIN, ILLINOIS

Signal Corps Holds Fifth Annual Symposium On Technical Progress in Communication Wires and Cables

The Signal Corps Engineering Laboratories held its Fifth Annual Wire and Cable Symposium at Asbury Park, N. J., on December 4, 5 & 6, 1956.

★ ★ ★

The meeting was highly successful, some 800 persons having registered during the three day session. The committee responsible for this year's Symposium consisted of:

Howard L. Kitts, Chairman
Chief, Outside Branch Plant, SCEL

Howard F. X. Kingsley, Co-Chairman
Chief, Wire and Cable Station, SCEL

R. Blain, Army Signal Communication Engineering Agency

C. T. Wyman
Bell Telephone Laboratories
Western Electric Company

B. Jore
Anaconda Wire and Cable Company

E. J. Burrough
E. I. duPont deNemours & Company

Vincent McBride
Plastic Wire & Cable Corporation

G. Hamburger
Copperweld Steel Company

★ ★ ★

In addition to the technical sessions, some 133 concerns sponsored the hospitality hour on Tuesday evening. At this affair refreshments, plenty of hors d'ouvres and an orchestra provided an atmosphere of congenial conviviality.

★ ★ ★

On Wednesday evening the annual banquet was held, the ballroom being crowded to capacity. An excellent show concluded the evening's activities. Following the dinner, with Mr. Kitts serving as master of ceremonies, those at the head table were introduced, which included the committee members and a number of top-ranking military men. There were no speeches as in previous years.

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At the opening of the technical session on Tuesday morning, Mr. Kitts welcomed the group to the Fifth Annual Wire and Cable Symposium and voiced his thanks to all those who had contributed to making the meeting successful, particularly the speakers.

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He then introduced Brigadier General **Earle F. Cook**, SCEL's Commanding General, who extended his welcome to those in attendance on behalf of the Signal Corps' Chief Signal Officer. He stated that industry does not support something that does not pay off and the ever-growing response could be taken to indicate that wire and cable manufacturers were finding the meetings well worth while. He pointed out that there was still much to be done on wire and cable for the Signal Corps and that research and development work must be carried on. General Cook concluded by stating his belief that the many papers about to be presented would point the way to many new developments, since the need for communication wire of all types is constantly expanding.

The Technical Sessions

Brief reference to the many papers follows. A number of these papers will be published in full in Wire and Wire Products from time to time.

★ ★ ★

"Kel-F 500, a New Fluorocarbon Wire Insulating Material" by **J. A. Jupa, The M. W. Kellogg Co.** This paper concerns a new plastic material developed in response to specification MIL-W-12349. This material has a high molecular weight and is able to withstand temperatures continuously as high as 200°C, although rated for 150°C and 175°C as a wire insulant. It is a crystalline polymer.

★ ★ ★

"Properites of Hypalon Wire Coverings," by **F. W. Keeley, E. I. duPont deNemours & Company,** described the properties of this elastomer, the speaker stating that it embodied good physicals and high resistance to deteriorating environments. The material has exceptional electrical and physical stability under the severest conditions encountered in wire and cable installations, is now in pilot plant production, but should be available commercially in the second half of 1957.

★ ★ ★

"Zytel Nylon Resin in Wire and Cable" by **A. L. Gibson, E. I. duPont deNemours & Company,** described a jacketing material that has high resistance to deformation at elevated temperatures and that has good abrasion resistance. Zytel 33 can be subjected to 200°C for a few minutes, will withstand 150°C for several hours without becoming brittle, but for continuous service is recommended for 105°C use. It is used as a jacket over PVC in Specification MIL-W-16878C and MIL-W-5086.

★ ★ ★

"High Speed Color Coding of PVC Insulated Wire" by **W. L. Hoff** of **Western Electric Company** told of the company's efforts to develop a system of coding wire in color, using a combination of dots and dashes. New inks and a mechanism were finally developed that accomplishes this at speeds of 2000 FPM, with an economical consumption of ink.

★ ★ ★

"Resistance of Rubber Covered Cable, Jacket, and Insulation Stocks to Weather and Artificial

Aging," by **P. Mitton, J. W. Bryden, F. Ruppert** and **M. Smith, Engineer Research and Development Laboratories,** Fort Belvoir, Va., described tests through which it was discovered that by using four parts of wax a GR-S rubber was made that exhibited no weather cracking in unstressed exposure to weather for two years. They also showed that low temperature properties were retained after exposure to desert conditions and that a general correlation between tensile strength retention after exposure and weather cracking had been indicated.

★ ★ ★

"**Aging** of Neoprene in a Weatherometer," by **G. N. Vacca** and **C. V. Lundberg, Bell Telephone Laboratories.** This paper provided the results of outdoor and oven aging tests on several formulations. The authors concluded that the weatherometer test used did not contribute materially to an estimation of expected outdoor service life. An accelerated zone test in conjunction with a 100°C air oven test, they felt, would provide a more accurate estimate of the field service life of the Neoprene jackets.

★ ★ ★

"**The** Effect of Carbon Black Surface Properties on the Stability of Polyethylene," by **John T. Moynihan, Acheson Dispersed Pigments Company.** Carbon black is an effective stabilizer for polyethylene with respect to light and weathering degredation. The structure of the carbon black, however, is important and it is desirable to seek structures that absorb energy at wavelengths greater than 300 millimicrons. Results of tests on various types of structures are given.

★ ★ ★

"**New** Developments in Cable Jacketing Compounds," by **D. W. Dahringer** and **W. T. Higgins, Bakelite Company.** Selection of plasticizers and other compounding ingredients in PVC compounds can produce different properties. To overcome shortening of vinyl materials for MIL-C-17B Specification, a new compound—NFD-3000—was developed that is "internally plasticized" without the use of plasticizers or other modifiers. Tests on this material were compared with typical other jacketing compounds.

★ ★ ★

"**Sub-Miniature** Coaxial Cable R. F. Power Ratings and Connector Characteristics," by **G. J. Mares** and **N. J. Sladek, Amphenol Electronics Corporation.** This paper discussed the growing demand for miniaturization in electronic components that has taken place in the last decade and the designs that have been developed to meet the new needs. Materials used, power ratings, temperatures and suitable connectors were described.

★ ★ ★

"**Aluminum** Sheathing Press," by **Oscar G. Garner, General Cable Corporation.** The author described and illustrated the first direct extrusion aluminum sheathing press to be used in this country, covering some of the engineering problems involved in making the process capable of producing a satisfactory product on a commercially feasible basis.

★ ★ ★

"**New** Developments in Silicone Rubber Compounds for Extruded Electrical Insulation," by **M. G. Noble, General Electric Company.** Types of applications, reasons for expanding use of these materials and the new polymers, fillers, vulcanizing agents and processing techniques were described, all tending toward the development of an "all purpose" insulating compound, which, while not yet achieved, is becoming closer to realization.

★ ★ ★

"**New** Developments in Silicone Rubber Compounds for Electrical Tapes," by **J. S. Hurley, Jr., General Electric Company.** The author examines the properties that make silicone rubber useful in the manufacture of wire and cable and the electrical industry generally; more particularly he describes the application of SE-100 rubber to ECC-116 glass cloth. Data on the dielectric constant and power factor of such tape is given. Semi-cured tapes to provide a good bond are also described.

"**High** Power, Low Noise Pulse Cables," by **R. Feller, The Okonite Company,** and **J. Agrios, SCEL,** told of the development of these cables for military use in high power modulators. The paper covered five pulse cables—RG-190, RG-191, RG-192, RG-193 and RG-194. Their constructions and electrical ratings were illustrated and descriptions of insulating materials, inner conductors, semi-conducting layers and outer conductor and interlayers were given.

★ ★ ★

"**Advantages** and Limitations of Aluminum Wire and Cable," by **H. R. Stoddard, R. E. Gross,** and **G. A. Snow, Simplex Wire and Cable Company.** The authors point out that copper shortages and instability of prices have made the use of aluminum attractive for some applications, especially since practically all types of insulation may be used without too many process changes. They review the various metallic cable components as to physical and electrical properties, chemical and corrosion resistance, joining and terminating and discuss the basic economies of cable construction. This included tapes, armor wire, sheath and other considerations.

★ ★ ★

"**Submarine** Cable Activities at the U.S. Navy Electronics Laboratory," by **G. V. Williams** of the **U.S. Navy Electronics Laboratory.** This was a copiously illustrated lecture describing the expanding harbor defense program and the requirements of the services for cable handling facilities.

★ ★ ★

"**Insulated** Parallel Circuit with Air Dielectric for Rural Telephone Service," by **W. T. Smith, C. R. Ballard** and **R. S. Bailey,** REA, **U. S. Department of Agriculture.** It was stated that open wire circuits will prevail in rural areas for the foreseeable future, although insulated wires have many advantages and, with new types of supports, will find increasing favor. Bare wire, insulated wires, twisted pairs, parallel extruded pairs, various types of leads and line con-

structions were discussed, with comparative figures on the economics of the several possible kinds of wires included.

★ ★ ★

"C-Rural Wire," by **A. P. Jahn, Bell Telephone Laboratories.** This paper is concerned with a one pair wire facility consisting of two parallel conductors insulated with polyethylene and intended for aerial use in rural areas. Some 10 million feet of this wire, a little over 6 months old, already has been placed in service. The wire is 14 AWG, 30% conductivity copper-steel, the insulant containing about 2½% of carbon black. Electrical characteristics, stringing tension and supporting techniques were given.

★ ★ ★

"Hi-Fax Potentials in the Wire and Cable Industry," by **E. W. Cronin, J. B. Martin** and **W. O. Bracken, Hercules Powder Company.** The paper treats of a new polymer and is in the nature of a progress report, rather than a finished treatise. The material is a linear ethylene polymer, made by low pressure polymerization developed jointly by Hercules and Farbwerke Hoechst A. G., Germany. The result has been higher heat resistance, greater hardness, density and tensile strength and somewhat higher chemical resistance. Data gathered from tests supported the presentation.

★ ★ ★

"Some Considerations on the Use of High Density Polythene in the Cable Industry," by **David Grant, Imperial Chemical Industries Ltd.** Polythene (polyethylene in the U.S.) was introduced 20 years ago and was first used for insulating high frequency and submarine cables, but since that time its use has broadened and it has become a basic raw material in the wire and cable industry. Contrasted with conventional polythene, the paper considers a new type of high density polythene developed in the last 3 years, in which low pressures and a catalyst are employed in its manufacture. Physical, electrical and mechanical properties, creep characteristics, environmental stress cracking, oxidation and weathering of the material are treated. The author points out that while the low pressure polythene is attractive to cable makers, there is still much to be done to assess its full potentialiites.

★ ★ ★

"Effect of Radiation on Polyethylene," by **V. L. Lanza, Bell Telephone Laboratories.** In exposing polyethylene to ionizing radiation, crosslinking of polymer chains occurs along with some chain scission and formation of unsaturation. Crosslinking, the most important reaction, increases molecular weight and, with sufficient doses of radiation, induces a three-dimensional gel structure. The effect of various degrees of radiation on properties and characteristics were shown in detail by the author.

★ ★ ★

"The Use of Irrathene Irradiated Polyethylene in Wire and Cable," by **Dr. K. J. Mackenzie, General Electric Company,** told of the increasing acceptance of an insulant developed two years ago—GE's Irrathene 201, a stabilized irradiated polyethylene. New forms of the material have been developed in the line, the paper being concerned with these. The types with their respective properties—general, electrical, thermal and mechanical—were given in detail for such applications as telephone, low voltage power, aerial distribution, service shop, control, hook-up, motor lead and coaxial wires and cables and other electrical uses.

★ ★ ★

"A Sealing Connector for Small Insulated Conductor," by **E. W. Bollmeier, Minnesota Mining & Manufacturing Company,** treated of a three year research effort to develop a compact, wide range, no-strip, sealing connector for plastic insulated conductors. Requirements of sealing connectors and the general properties of the shear type sealing connector, the author concludes, meet with the specifications set forth, which is designed primarily for making connections in "pigtail" fashion.

★ ★ ★

"Cold Extrusion of Teflon 6 Tetrafluoroethylene Resin for Wire Insulation," by **D. DeYoung** and **G. R. Snelling,** Polychemicals Dept., **E. I. duPont deNemours & Company.** After outlining the physical and electrical properties of Teflon and stating its applications in the wire field, the authors cover the several methods of covering wire —dip, extrusion, calendering and taping—dwelling at some length on the mechanical considerations of covering wires by the extrusion process.

★ ★ ★

"A Practical Approach to the Extrusion of Thermoplastics," by **W. Hooper,** Polychemicals Dept., **E. I. duPont deNemours & Co.** This paper is a basic treatise on the coating of wire by the extrusion process, including a mathematical expression of the volumetric displacement, or drag flow, in terms of the screw dimensions. What should be expected of an extruder is defined, in order to make practical use of the equations. The author has endeavored to provide an understanding of the function of each section of the screw. How extruder performance can be gauged accurately is described.

★ ★ ★

"How to Predict Extruder Performance," by **B. H. Maddock, Bakelite Company,** provides a theoretical concept of extruder output in terms of forward flow through the screw channel, opposed by the back flow through the channel and through the clearance between the thread and the cylinder wall. Using equations for this purpose, the author shows how extruder performance can be predicted. Charts support the discussion.

★ ★ ★

The Committee is to be congratulated on the success of the meeting.

★ ★ ★

Questions regarding information contained in any of the papers should be directed to the authors.

Wire in Other Countries

These notes have been taken from various recent issues of Draht-Welt, translated and condensed by Jerome W. Howe, Worcester, Mass.

Spain—The recently built 16,000-ton City of Toledo, having on board an industrial exposition of 923 exhibitors, recently visited South and Central America and Africa, visiting one port after another. The results of this enterprise exceeded expectations. 600,000 visitors in Rio de Janiero, one million in Buenos Aires are examples. The Spanish wire industry was represented by a dozen firms, who exhibited wire nails, cable, fence wire, wire rope, wire netting, baling wire, ship nails and other products. The Spanish wire industry's capacity, however, is small and was soon sold out for 1957.

★ ★ ★

USSR—There are reports of price undercutting on exports by the East Block industry. On wire products the differences are in some cases marked. For example, wire nails are offered 10% to 15% under the prices quoted by the European Community for Coal and Steel. For barbed wire the price differential is around $25 a ton. The export industry of the East Block protests that the offers are fair, but the East Block exporters, especially those of the Soviet zone, engage as yet in limited exports, because plant capacities are inadequate. This situation can however change before long, as the production of steel and finished steel products is climbing fast.

★ ★ ★

Some recent contracts for Soviet Zone and East Block wire are, for example, 150 tons of wire nails at $107 FOB for Indonesia, around 140 tons at the same price for Ceylon, around 40 tons at $105 for Lebanon, 200 tons of galvanized barbed wire for Burma, 118 tons of annealed baling wire for Hong Kong, and 110 tons of galvanized fence wire for Ethiopia. A greater number of similar contracts were noted with Latin American countries. In export circles it is felt that in the aggregate the East is releasing important quantities for export.

★ ★ ★

Other Countries—The more we enter upon an age of specialization, the more important becomes the matter of wire products, and with new kinds of products continually appearing, these are gaining importance in international trade. Especially are such products of interest to those countries not fully industrialized and not yet capable of producing wire specialties.

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Some of the products that are currently being exported from Germany are: low carbon wire, as book binder's, hat, brush, drapery-pin, safety glass, hair-pin, toothed stoker wire, etc; high carbon wire, as armored cable, aircraft tire, spiral spring, furniture, zigzag, rubber hose reinforcement, spoke and valve wire; and other kinds, such as sack-closing basket, carton, tie wire and other special types.

★ ★ ★

African colonies are not expected to buy as much as in the previous year. The South American business, weak for some time, is becoming stronger, especially in bright, annealed and fine galvanized wire. Wire nails may be less in demand. Asian business, with the exception perhaps of Burma and Ceylon, should show higher turnovers than in the past year. The demand everywhere is good and in none of these countries are there heavy inventories.

★ ★ ★

Neither Australia nor New Zealand will order to the same extent as last year, the foreign exchange having become unfavorable. Japanese competition, very active internally, shows no tendency, except in trade with the U.S.A., to become more intense in the export trade. No underbidding worthy of mention is to be expected in the near future.

★ ★ ★

Machinery—In most wire product machines a lively foreign trade is expected, in spite of the all-too-long terms of delivery. Competition is increasing. For example, both Swiss and Japanese wire machines are offered in foreign markets. The East, especially Czecho-Slovakia, is offering modern wire nail machines and accessory machines of various types, at favorable prices, yet not many can be delivered. The pressure of used wire products machines on export business has abated, especially in wire drawing and wire netting machines.

★ ★ ★

Japan—The wire rod supply remains tight and apparently is likely to remain so for some time. It is interesting that the Japanese, who for some time were interested in the importation of wire rod, have almost completely reversed the situation and now are beginning to export, though only in small quantities. The price lies about on a level with European quotations with only two to three dollars per ton reduction, yet one must remember that, respecting freight, the markets most interesting to Japan are Indonesia, the Philippines, Malaya and Red China (partly via Hong Kong). For the first time 1,000 tons of wire rod were very recently sold to the U. S. A. The contract price amounted to 6.21 cents per pound, including duty. To have the duty included in the price is a novelty in the export business. They are doing it now also in quotations to India, from where, however, so far only a few trial orders have come.

Electro-Erosion in the Wire Industry

In the working of metals, significant progress has occurred through the introduction of the so-called electro-erosion process. It has been used but little until now, and it has long been clear that through this new process no sweeping revolution is as yet to be expected. In the wire industry however some changes may be possible, which should be promptly made, or at least tried. Of course the factor of productivity remains decisive, for it is no good to install a new method at great expense if this is in question.

* * *

In the June 23, 1956 number of VDI-News it is stated: "A special field is the manufacture of dies for the wire industry. Here is involved the production of very accurate forms out of very hard material. In this connection it is to be remembered that the manufacture of so-called diamond dies for the production of fine tungsten filaments (for light bulbs) has for some time been undertaken with the aid of the electric spark. The mechanical boring of diamonds with a steel needle with diamond dust suspended in oil takes weeks and months."

* * *

The new method of working metal involves an apparatus for bringing an electric spark in contact with the piece. This is not to be confused with the melting or burning out of material by high degrees of temperature through electric arc. The surface of the piece is not heated, but the parts to be removed are blown off. For continuous production by electric spark a condenser must be periodically charged so that the energy slowly accumulated will be suddenly discharged in an electric circuit of small impedance. A very important problem for a continuous and even performance by electro-erosion is the automatic and exact feeding of the electrode. This has to be adjusted to the speed of the work.

* * *

By this working of the surface one is naturally entitled to the presumption that the piece may be somewhat distorted, or at least the surface be made unusable. In the article above referred to it is given to understand that this is not the case. The surfaces present a beautiful, uniformly dull appearance. However comparison with polished surfaces is naturally not possible. With electro-erosion manufactured dies and cutting tools are subject to a slight wear. It is accepted that not so strong a claim is made for the surface produced by this process as for surfaces produced by conventional methods.

* * *

Machines for electro-erosion are already available. The method is adaptable to all metals, regardless of their hardness. It is therefore especially suitable in cases where ordinary tools have not availed.

(Reprinted through the courtesy of Draht-Welt)

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

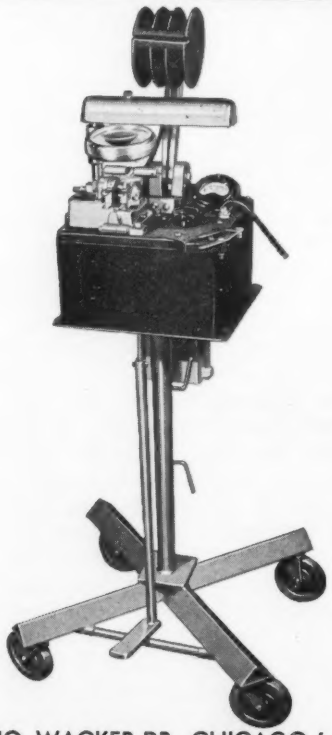
MODEL S.E.M.T. MICRO-WELD BUTT WELDER

This welder was designed and developed expressly for welding all types of fine wire: Aluminum, Copper, Brass, Bronze, Steel and Steel Alloys, ranging in size from .005" to .020" diameter.

Unit design of frame, transformer and power sub-assemblies permit other range of sizes to suit requirements.

Equipped with a temperature indicating annealing and tempering device, voltage regulator and meter to compensate for voltage fluctuation, wire cutters, extra large 5" diameter magnifying glass, fluorescent light and extension cord. Welder can be supplied for bench mounting, or mounted on 4-wheel truck.

The adaptability of this unit for welding all types of wire, either ferrous or non-ferrous, in sizes from .005" to .020" diameter, makes it ideal for the fine wire manufacturer.



MICRO PRODUCTS CO.,

20 NO. WACKER DR., CHICAGO 6, ILL.
Telephone: STATE 2-7468

Purification of Pickling Solutions

The firm of **Zahn & Co., GmbH,** Hameln (Weser), Berlin, has for some 30 years been engaged in the development of plants for the purification or regeneration of pickling solutions, of which the problem is the separation of the iron sulphate resulting from the pickling, with simultaneous reclaiming for repeated use of the free acids held in solution. Such installations offer to industries employing pickling processes the advantage of avoidance of contamination of watercourses.

★ ★ ★

By various cooling systems (with brine, water or air as coolant, or through suitable vacuum) heptahydrate ($FeSO_4 . 7H_2O$) is produced. Several years ago the monohydrate method was developed that made possible the immediate separation of $FeSO_4.H_2O$ out of the pickling solution. This salt of low water content can by calcination be converted into iron oxide or powdered iron, with simultaneous recovery of the sulphuric acid. The first such installation is now under construction. The process is claimed to be extraordinarily economical.

(Reprinted through the courtesy of Stahl und Eisen)

ASTM Methods for Chemical Analysis of Metals

The 1956 edition of the book of ASTM Methods for Chemical Analysis of Metals is the first complete revision of the volume since 1950. It contains methods for chemical analysis of ferrous and non-ferrous metals and alloys, complementing Part 1 on Ferrous Metals and Part 2 on Non-Ferrous Metals of the Book of Standards.

★ ★ ★

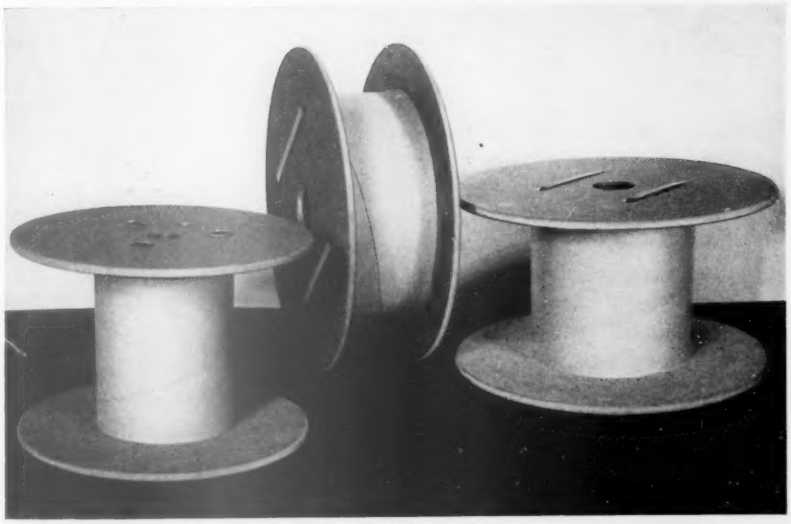
Ten completely new methods and recommended procedures are given. These include chemical analyses for electronic nickel and titanium and two important recommended practices in the field of spectrochemical analysis. In addition, ten standards have been revised since 1950. The book contains

ESPECIALLY DESIGNED FOR WELDING WIRE AND THE AIRCOMATIC WELDING PROCESS

CARRIS

Non-Returnable Presdwood and Hardboard

SPOOLS



Saves you

COSTLY FREIGHT

HANDLING COSTS

VALUABLE PLANT SPACE

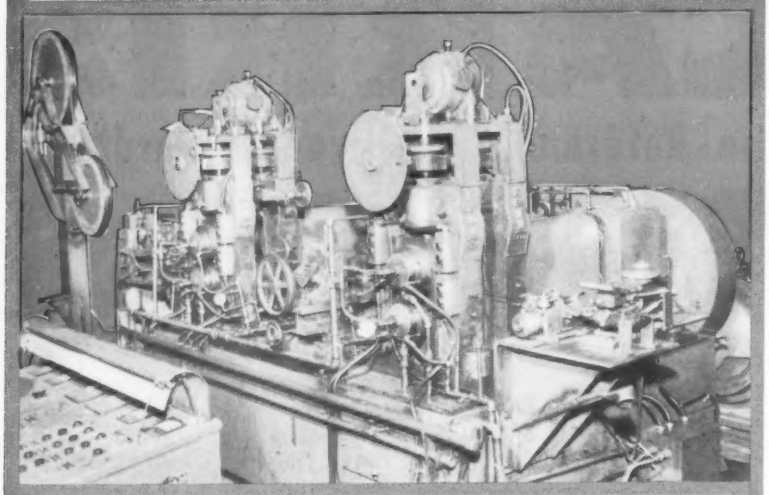
You buy better Non-Returnable Spools when you choose Carris. They wind truer, are more uniform and are designed by men with a practical knowledge of the Wire Industry's needs. Write, wire, or phone Prospect 3-7388 your requirements. Our own trucks give almost instant delivery.

CARRIS REELS, INC.

70 PARK STREET RUTLAND, VERMONT

SPECIALISTS IN THE DESIGN AND MANUFACTURE OF PLYWOOD REELS AND SPOOLS

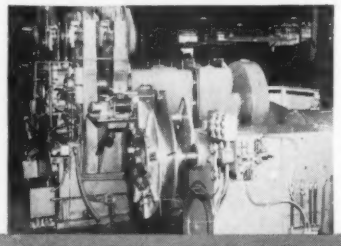
ROLLING WIRE AT 1200 FPM



THIS Fenn Model 082 Tandem Rolling Mill is in operation at the Continental Steel Corporation, Kokomo, Indiana, and is an excellent example of modern, high speed, precision wire flattening. With this mill, Continental reports production speeds of 400 FPM to 1200 FPM. Wire sizes run ranged from 0.5 in. x .130 in. at 1600 lbs., per hour down to .197 in. x .024 in. at 600 lbs., per hour.

In addition to its precision operation and compactness the Model 082 mill features a one piece bed, automatic loop regulator, power screw-downs, friction-driven edger, electronic gaging, and hydraulically traversing take-up reel.

Whatever your requirements for rolling ferrous and nonferrous metals in sheets, strips, wire or rod, it will pay you to investigate the Fenn line of Precision Rolling Mills. Fenn engineering service is available at all times to help you solve any rolling problem.



FENN

SEND FOR NEW FENN ROLLING MILL CATALOG

Precision Rolling Mills

Turks Heads

Wire Shaping Mills

Swaging Machines

Wire and Tube Drawing Machines

THE FENN MANUFACTURING COMPANY, 606 FENN ROAD, NEWINGTON, CONN.

42 methods of analysis including four spectrochemical procedures. There are five recommended practices and one specification. Some standards contain comprehensive diagrams of apparatus and pertinent charts.

* * *

The standards in this book were formulated by Committee E-3 on Chemical Analysis of Metals and Committee E-2 on Emission Spectroscopy. The methods are intended for reference purposes in marketing and purchasing of metals and alloys according to specifications and provide chemists with means of judging adherence of materials to specifications.

* * *

Copies of the book in cloth covers may be obtained from the **American Society for Testing Materials,** 1916 Race St., Philadelphia 3, Pa., for $8.00 each.

ASTM Standards on Zinc-Coated Iron and Steel Products

This publication is intended primarily to present in a convenient form for reference the various **American Society for Testing Materials** standards and tentative methods for test and specifications pertaining to metallic coated iron and steel products. Standards, tentative specifications and methods of test represent the most up-to-date thoughts and practices.

* * *

This compilation is sponsored by Committee A-5 on Corrosion of Iron and Steel. Included are all specifications coming under the jurisdiction of this Committee. In addition, selected specifications written by Committee A-1 on Steel, A-2 on Wrought Iron, B-1 on wires for Electrical Conductors, and B-2 on Non-ferrous Metals and Alloys may be found in this compilation.

* * *

Included in the volume are 21 specifications of which four are new or recently revised; three recommended practices, two of which are new; and five methods of tests. Among the materials covered are wire, strands, fencing, sheets,

hardware, terne-alloy-coated sheets and miscellaneous products.

★ ★ ★

This compact book should be of interest to engineers, construction personnel, and metallurgists. Copies may be obtained from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa., for $2.25 each.

Stahldrahterzeugnisse (Steel Wire Production)

This work is published in two clothbound volumes by **Verlag Stahleisen M.B.H.,** Breite Strasse 27, Dusseldorff, Germany, and sells for DM 70.

★ ★ ★

It is edited by the Committee for Wire Processing of the Verein Deutscher Eisenhuttenlenleute, Volume I containing 231 illustrations and 45 tables in 340 pages and Volume II containing 293 illustrations and 47 tables in 315 pages of text matter in the German language. The books describe the most modern practices and were published in 1956.

★ ★ ★

The work represents a most comprehensive treatment of the broad and important field of wire, embracing ferrous wires of all common types for nails, screws, rivets, woven and welded fabrics, needles, tire beading, chain, rope and many other products. Much space is devoted to wire product fabrication.

★ ★ ★

Each section has been written by an expert in his particular field, giving the publication both authority and a high degree of practicality.

Plastic and Synthetic Fibres Provide Corrosion Resistant Fume Ducts

The Ceilcote Company, Inc., 4846 Ridge Rd., Cleveland 9, Ohio, has announced the development of Duracor corrosion resistant plastic fume ducts and fume hoods. Fabricated of a thermo-setting plastic material which is combined with glass or other synthetic

NOW the TINIUS OLSEN
ElecTmatic
LO-CAP
UNIVERSAL TESTING MACHINE

This 1000 lb. capacity ElecTmatic LO-CAP is equipped with Type KR Grips for rapid, efficient testing of wire samples in a leading wire mill.

CAPACITIES TO 5000 LBS.
Ideal for testing wire and other specimens, Olsen LO-CAPS are available in standard capacities of 100, 200, 500, 1000, 2000 or 5000 lbs. Higher capacities are also available.

SelecTrange DIAL INDICATION
Load is indicated on the 15-inch color coded dial using the exclusive Olsen Torque Bar Weighing System.

POSITIVE TESTING SPEEDS
. . . infinitely variable crosshead speeds from 0.3 to 12 inches per minute. Speeds are positive under load or no load.

COMPACT
Entire machine occupies less than five square feet of floor space.

CHANGE RANGES DURING TEST
Either of two range capacities—full range and ¼, ⅕ or 1/10 capacity—are instantly available with a flip of the SelecTrange switch.

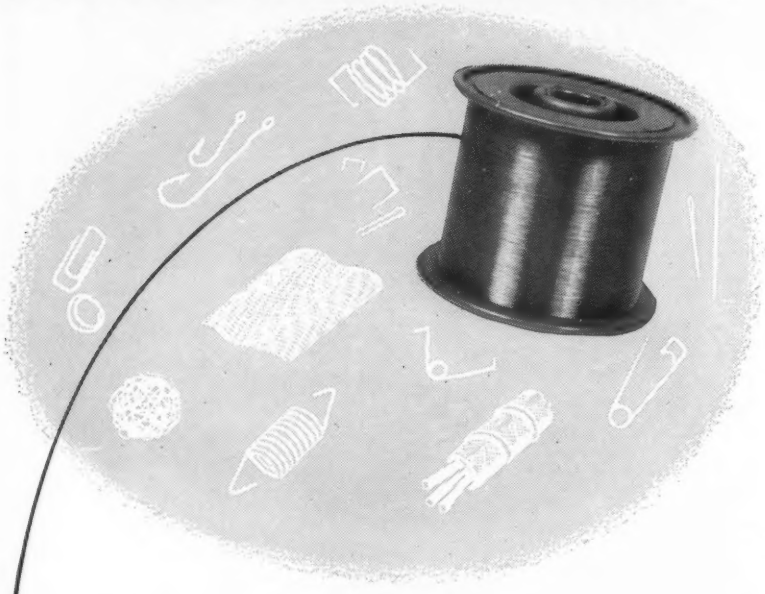
UNMATCHED FLEXIBILITY
. . . for tension, compression or flexure testing. Stress-strain curves can be made with LO-CAPS equipped with an Olsen electronic recorder, using strain instrumentation—even when "fragile" specimens such as cellophane, fine wire, etc. are tested.

Get the full story.
WRITE TODAY
FOR BULLETIN 54.

TINIUS OLSEN
TESTING MACHINE COMPANY
2140 EASTON RD. WILLOW GROVE, PA.
Testing and Balancing Machines

Trademark
Reg. U.S. Pat. Off

FOR FINE WIRE PRODUCTS . . .



Almet Stainless Steels

MEET MORE REQUIREMENTS THAN OTHER ENGINEERING MATERIALS

Does your Fine Wire application call for resistance to heat? . . . to corrosion? Does it require good fatigue properties . . . excellent weaving or other forming characteristics? There's a good chance you will find the material you need among the more than 20 grades of stainless steel we fabricate into high quality Fine Wire. No other family of metals has the combination of properties common to the stainless steels.

Learn more about the interesting properties and applications of our stainless steel Fine Wire, as well as our stainless Rod and Strip . . . send today for a copy of our new 40 page Stainless Steel Design Handbook.

Write to Alloy Metal Wire Division, H. K. Porter Company, Inc., Prospect Park, Pa.

HKP ALLOY METAL WIRE DIVISION
H. K. PORTER COMPANY, INC.

fibres, the new ducts and hoods can be produced in any required shape.

★ ★ ★

The combination of chemical resistance, lightweight, strength, easy workability, design, flexibility and attractive appearance make Duracor an ideal material for the construction of plating, pickling and chemical fume ducts. These hoods and ducts provide a high degree of resistance to acids including hydrofluoric as well as alkalis and solvents.

★ ★ ★

Physical properties of Duracor materials range from 11,000 to 15,000 pounds per square inch for tensile strength, and flexural strength ranges from 22,000 to 30,000 per square inch depending upon desired material thickness.

★ ★ ★

Write today for complete information.

High-Temperature Lubrication With Colloidal Dispersions Described in Bulletin

A compilation of current good practice in high-temperature lubrication with colloidal dispersions is contained in a new brochure, Bulletin No. 423, which has just been published by **Acheson Colloids Company**, Port Huron, Mich.

★ ★ ★

The bulletin contains case histories that describe how 'dag' Colloidal Graphite, a high-purity electric-furnace graphite processed to colloidal size and dispersed in a wide variety of fluid carriers, is effectively used for general high-temperature lubrication of oven conveyor chains, kiln car wheel bearings and virtually any other type of mechanical equipment. Also discussed are applications for 'dag' dispersions of Molybdenum Disulfide.

★ ★ ★

Methods for increasing die life and obtaining better finish at less cost in such operations as forging, extrusion, stamping, wire-drawing, deep-drawing and stretch-forming, are presented in the bulletin.

Copies of Bulletin No. 423 may be obtained from Acheson Colloids Company, Division of Acheson Industries, Inc., Port Huron, Mich.

★ ★ ★

For further information please contact Bernard Livingston, John Mather Lupton Co., Inc., 420 Lexington Ave., New York 17, N. Y., MUrray Hill 9-0950, or Thomas Treleaven, Acheson Colloids Co., Port Huron, Mich.

U.S. Borax to Move to Rockefeller Center

In a move to bring together the offices of its several divisions, **United States Borax & Chemical Corp.** has leased the 8th and part of the 9th floors of 50 Rockefeller Plaza, New York, N. Y. The offices will be the headquarters for the **Pacific Coast Borax Company** and **United States Potash Company** Divisions. The offices are expected to be ready for occupancy about June 1, 1957.

New Literature on Protective Coatings

Nukem Products Corp., 111 Colgate Ave., Buffalo 20, N. Y. has issued a series of new bulletins of interest to wire men. These are:

Bulletin 101 on Nukem All-Purpose Resinous Cement for acid tanks, floors etc. The material bonds to brick and will not shrink or crack.

Bulletin 102 on Nukem Silicate Cement, a low cost, chemical setting, high temperature acid proof cement for brick construction.

Bulletin 103 on Nukem Concrete Primer, an acid-proof liquid for preparing surfaces for Nu-Mactic, the company's tank and floor material.

Bulletin 104 on Nukem Basolit cements, a sulphur base cement for every acid-proof job in tanks, floors and sewers.

Bulletin 105 on Nukem Multibond Cement for acid tank linings and flooring. This is for brick and is mixed on the job.

Bulletin 106 on Nukemite 10, an atmosphere and acid corrosion protection material for steel, concrete and wood.

★ ★ ★

Technical data on the uses, applications and properties of each material is stated fully in the bulletins, any or all of which may be received upon request to the company.

EFFICIENT, MODERN SYSTEMS

FOR

ELECTRICAL WIRE & CABLE MANUFACTURING

• *CABLE LACQUERING SYSTEMS*

Conventional cellulosic, or other type, lacquers are applied in successive continuous coats from one to twenty-eight coats over fibrous braid wrapped primary conductors. One end, four ends, or eight ends of wire are handled continuously. System includes letoff, application, drying and constant tension takeup equipment.

• *WIRE ENAMELING SYSTEMS*

Natural and synthetic enamels, silicones, solution nylon, modified plastisol, and similar insulating coatings are applied to bare, cotton or glass covered wire in round, square or rectangular cross section. Ten or twenty simultaneous strands are handled. Systems are complete with letoff, preannealer, application system, capstan and multiple takeup unit.

• *ASBESTOS INSULATING SYSTEMS*

Carded asbestos is applied to continuous single conductor as an integrated operation with saturating, rotary forming, drying, cooling and polishing of the finished wire. Wire from No. 20 gauge to No. 6 AWG is handled through an asbestos wall thickness range of from .008" to .040" thickness in a single pass.

• *RUBBER OR PLASTIC JACKETING SYSTEMS*

Rubber and thermoplastic jacketing compounds are continuously applied to electrical wire or cable by the extrusion method. High speed, constant tension letoff and takeup equipment, controlled cooling or continuous vulcanizing equipment are powered by synchronized range drives as complete, integrated wire handling systems. Extrusion machines of customer's choice are furnished.

• *GLASS & VARNISH COATING SYSTEMS*

Double layer of glass or cotton wrapping is applied to round, flat or square conductor. Two individual coatings of high temperature varnish are applied and the finish baked in a continuous operation. Units are complete from letoffs to takeup frames.

• *SELF TRAVERSING REEL CORD DRYERS*

These ingenious machines are used to remove hygroscopic moisture from fibers, braided or knitted flexible cable. These machines increase extrusion speeds, reduce blister scrap loss and improve diameter control. They are easily installed in existing extrusion line.

TECHNICAL INFORMATION ON ANY OF THESE PROCESSES UPON REQUEST

C. A. LITZLER CO., INC.

1817 BROOKPARK ROAD

CLEVELAND 9, OHIO

NOW ...Wire of High Finish for Electroplated Products in Many Shapes & Sizes

Bright, Smooth No. 3 Finish takes Plating Beautifully—Adds Eye-Appeal to Your Products

Continental's new technique for producing #3 finish flat and special shaped wire offers you a range of standard and special wire shapes with a satin smooth finish for electroplating purposes. Previously, only flat wire with a surface suitable for high polish electroplating was obtainable...but now from Continental you can specify #3 finish in flat, square, rectangular, oval, and other shapes on inquiry, in practically any size, temper, and analysis in low carbon and medium low carbon steels. (Note—some sizes of above shapes require special tooling before they can be produced.) Here is extra "eye-appeal" for moldings, product trim, or wherever a formed plated wire component is required. Send us a blueprint of your part, or mail the coupon today.

SPECIALISTS IN WIRE
FOR OVER HALF A CENTURY

CONTINENTAL
STEEL CORPORATION
KOKOMO, INDIANA

PRODUCERS OF:
Manufacturers' wire in many sizes, shapes, tempers and finishes, including Galvanized, KOKCTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special wire. ALSO, Nails, Continental Chain Link Fence, and other products.

FILL OUT AND MAIL TODAY

Gentlemen: Please send us complete information concerning the new Continental #3 Finish Wire for Electroplating.

NAME_____
TITLE_____
FIRM_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

Chase Brass Moves NYC Warehouse

After forty-two years at 80 Lafayette St., New York, **Chase Brass & Copper Co.** moved its office and warehouse business to its own new building at 55-60 58th St., Maspeth, Long Island, in December.

★ ★ ★

Chase, a subsidiary of **Kennecott Copper Corp.,** operates a chain of 25 brass and copper warehouses in principal cities across the nation. The new New York warehouse, however, is the pride of the system for it is not only the largest in warehouse and office space, but will be the best equipped with material handling, receiving, storing and shipping facilities. All this, plus ample parking areas, makes this the "dream" warehouse of the entire Chase system.

★ ★ ★

The warehouse area is of some 60,000 square feet capacity, designed to provide maximum efficiency for storing and handling materials. The office space of some 13,000 square feet includes private offices for the district manager, the office manager and the Eastern area regional manager. The entire office area is also well appointed, with a view toward comfort and efficiency.

Convention Paper Reprint Available

Reprints of the paper "Automatic Control of Insulated Wire Diameter" which discusses the practical aspects of control in production, are available to interested persons in the insulated wire, extruded tubing and shapes and allied industries.

★ ★ ★

This paper was prepared by **C. M. Fredrickson** of **Kaiser Aluminum & Chemical Corp.** and **Charles D. Gibbs** of Industrial Gauges Corp. and was presented at the 1956 meeting of The Wire Association. It discusses the savings effected by the use of continuous

non-contact diameter control equipment, the value of the same equipment in analysis of malfunction of an extruder and also describes the measuring and control circuit features.

★ ★ ★

Reprints are available by request to Industrial Gauges Corporation, West Englewood, N. J.

New Catalog on Varnished-Cambric Cables

A new catalog on Varnished-Cambric Cables has just been published by **Rockbestos Products Corp.**, New Haven 4, Conn.

★ ★ ★

It covers the complete line of varnished-cambric cables in a voltage range of 600 to 5000 volts for single and three conductor cables braided or lead sheathed. Armored cable constructions in both galvanized steel armor and aluminum armor are shown in 3 and 4 conductors.

★ ★ ★

The useful Engineering Data Section covers such items as:

Conductors and Conduit.
Insulation Thickness.
Tests.
Braids and Finishes, Shielding, Lead Thickness.
Armored cable racks and components.
Terminators for interlocked cable.
Electrical Circuit Formulae.

★ ★ ★

Copies of the catalog are available to our readers upon request to the company.

NEBCO Acquires Another Plant

The New England Butt Company, Division of **Wanskuck Company,** has acquired the physical assets, namely the building and machinery, of the **Providence Engineering Works** at 521 South Main Street, Providence, R. I.

★ ★ ★

This 35,000 square feet of floor space with its numerous machine tools, which include 120″ vertical boring mill, 48″ x 20′ lathe, 96″ x 64″ x 14′ planer, a 200 ton hydraulic forcing press, 100 ton hydraulic straightening press, 25 ton

Plans call for reels?

CALL APCO MOSSBERG!

Next time you need steel reels, spools or bobbins, pick up your phone and call Apco Mossberg *collect* . . . Attleboro, Massachusetts, 1-0340.

Chances are that Apco can match your complete requirements right from stock . . . offer prompt service on all types of standard reels, spools and bobbins.

Remember, too . . . Apco Mossberg engineers can meet your special requirements with custom-made reels designed and made to your exact specifications.

Call us collect or send specifications for recommendations *at no obligation!*

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APCO MOSSBERG COMPANY
LAMB STREET, ATTLEBORO, MASSACHUSETTS

TRADE-MARKS WHICH IDENTIFY THE ORIGINAL AND THE BEST

"PHOSPHOR BRONZE."®

Phosphor Bronze ®

ELEPHANT BRAND®

A little more than seventy-five years ago a wonderful new kind of copper and tin alloy possessing high tensile strength, great resiliency and unusual corrosion-resistant properties was introduced to American industry. This new bronze alloy had been perfected by the addition of a small amount of phosphorus to the copper and tin mixture.

No other producer of metals in the United States was able to duplicate this extraordinarily useful alloy. Therefore, because of the uniqueness of this new phosphorus-bearing *alloy*, the smelters responsible for its creation gave it a trade name "PHOSPHOR BRONZE" and adopted for itself the firm name of The Phosphor Bronze Smelting Company.

This was the first Phosphor Bronze ever produced in the United States of America.

"Phosphor Bronze" was immediately accepted by America's burgeoning industry. Demand for the new alloy grew by leaps and bounds and The Phosphor Bronze Smelting Company soon had many imitations of its products. So, to protect customers from spurious imitations, the trade name of "Phosphor Bronze" was incorporated into two distinctive *trade-marks* which were duly registered in the U. S. Patent Office on February 21, 1888. These trade-mark registrations have been maintained, in full force, throughout the intervening years and are presently owned by The Phosphor Bronze Corporation, successors to the original Phosphor Bronze Smelting Company.

In time, new variations of the original "Phosphor Bronze" alloy were introduced by the now-famous smelting Company. To identify these, the trade name of "ELEPHANT BRAND" was adopted, together with a distinctive picture of an elephant. The words "ELEPHANT BRAND" were incorporated into a *trade-mark* and registered with the U. S. Patent Office on August 20, 1907. The picture of the elephant shown in this advertisement, is a new one, designed to supersede its 1906 predecessor and was Registered, as a *trade-mark,* on October 2, 1956.

We are proud that American industry has wholeheartedly accepted our product. The name "PHOSPHOR BRONZE" has become internationally known and is familiar to metalworking men and metallurgists everywhere.

In view of this unanimous acceptance and usage, we—the officers, stockholders and employees of The Phosphor Bronze Corporation acknowledge the universal use of the name and herewith bequeath it to the American metalworking industries. We reserve only . . . the exclusive right to use the trade-marks illustrated above.

THE PHOSPHOR BRONZE CORPORATION

A Wholly Owned and Operated Subsidiary of The Seymour Manufacturing Company

SEYMOUR, CONNECTICUT

traveling crane, metalizing equipment, cylindrical grinding machine 12″ x 86″ and 2 close grinders for grinding rolls to 48″ in diameter, permits the company to offer additional service as machinists.

★ ★ ★

"In addition to manufacturing larger models of our wire cable and stranding machines, we are prepared to build complete machines and machine parts made to customer specifications. We also repair and rebuild miscellaneous heavy machinery," stated **Charles Haggerty,** NEBCO's Vice President.

★ ★ ★

This department now employs 15 men, which will be increased to 30 as soon as the overhauling of the additional equipment is completed.

"Premium" Strand Wire Rope Announced by Macwhyte

In a current issue of "Ropeology," the Macwhyte Co. announces that "Premium" Whyte Strand is the name adopted for the company's "Extra Improved Plow Steel" Wire Rope.

★ ★ ★

The announcement states that this Wire Rope is 15% stronger than 'Monarch' Whyte Strand Improved Plow Steel Wire Rope.

★ ★ ★

"Premium" grade is best suited to extra heavy duty installations. Because of its 15% added strength, it provides a higher safety factor for such work.

★ ★ ★

The new rope is made by Macwhyte Company and is offered in both the 6x19 wire rope classification and the 6x37 wire rope classification in Independent Wire Rope Core construction only.

★ ★ ★

In addition, Macwhyte "Ropeology" illustrates the use of braided wire rope slings when used in combination with single-part wire rope slings, a tough digging job into a hill of all rock approxi-

mately 200 feet long by 35 feet deep; and a drilling operation in Minnesota.

★ ★ ★

Further announcements contained in the bulletin include special wire rope assemblies made of swaged fittings permanently attached to wire rope.

★ ★ ★

Copies of this bulletin may be had by writing to **Macwhyte Company,** Public Relations Department, Kenosha, Wis., requesting bulletin 5685.

Nachman Buys Owen Spring Division

Nachman Corporation of Chicago, manufacturers of spring units for bedding, furniture and automotive industries, has purchased the assets of the Owen Silent Spring Division of **American Chain and Cable Co.** at Bridgeport. The Owen Division employs about 40 persons. The Chicago corporation also acquired the assets of the Owen Division at Pittston, Pa.

Scovill Host to Quality Control Men

On December 12th more than 200 members of the Southern Connecticut Section of **The American Society for Quality Control** were guests of **Scovill Manufacturing Company,** Mills Division, on a visit to the Scovill Brass Casting Shop, Tube Extrusion Department and Continuous Strip Mill.

★ ★ ★

Guests were conducted on a tour planned to show the complete cycle of Scovill's modern brass mill products production, including the unique continuous brass billet and bar casting machines, largest and most modern equipment of their types in full scale operation in the brass industry and were able to study Scovill's coordinated methods for step by step close precision quality control from the sampling of each melt before pouring, through casting, to final tube extrusion and flat-metal continuous rolling operations.

...and here's why!

Now you can enjoy lower freight charges and greater protection against damage with the new, lighter weight NYECO steel reels. They cost so little more, last 12 times longer than wooden reels, require minimum maintenance. Rugged weatherproof, splinter-proof, warp-proof protection protects costly cable against damage due to dropping, bouncing, rough handling.

Think it over and you'll agree that it doesn't pay to risk an investment of thousands . . . and your reputation . . . on inferior reels.

* These leading mills are just a few of the many that use NYECO Steel Reels: ANACONDA, GENERAL CABLE, OKONITE, PHELPS DODGE, ROEBLING, WESTERN ELECTRIC

- *ANY QUANTITY*
- *ANY SIZE*
- *ANY LOAD*
- *FLANGE DIAMETER From 36" UP*

Write • Phone • Wire

NYECO

Specialists to the Wire Industries for Over 45 Years

NEW YORK ENGINEERING COMPANY

75 West Street, New York 6, N. Y.

TELEPHONE: WHitehall 4-5380 **CABLE:** NYECO, N. Y. **PLANTS:** YONKERS, N. Y.

Outstanding Personalities of the Wire Industry

Veteran Sales Executive Retires

N. L. (Beanie) Hite, who completed a half-century with the **Continental Steel Corp.,** Kokomo, Ind. on November 19, retired from his position as Sales Manager of the corporation's Wire Division at the first of the year. He went to work in the steel industry in 1906 for Continental's predecessor, the **Kokomo Steel and Wire Co.,** and he has held his present position since 1938.

★ ★ ★

He has been with Continental longer than any other member of the main office staff and is widely known throughout the steel industry as an expert on wire and nails. His career has closely followed the company's growth from a small concern to a large, thriving industry.

★ ★ ★

Mr. Hite plans to divide his time between Florida and his summer home at Lake Manitou, Ind.

N. L. Hite

Crucible Steel Appoints Managers

Crucible Steel Company of America announced the appointment of new managers at two of its larger plants.

Reinhold Schempp has been named manager of Sanderson-Halcomb Works, Syracuse, N. Y., and **S. A. Fronek** was chosen to head Park Works, Pittsburgh. Each previously served as assistant manager of his respective plant.

★ ★ ★

Mr. Schempp succeeds **R. A. Schneid** as head of the 3,000-employe Sanderson-Halcomb Works, said to be the largest tool steel plant in the world.

★ ★ ★

Mr. Fronek replaces **S. A. Jackson** at Park Works. Employing over 2,000, Park Works has a history of nearly a century of specialty steel processing.

★ ★ ★

Both Mr. Schneid and Mr. Jackson retired on December 31, 1956, after long careers with Crucible.

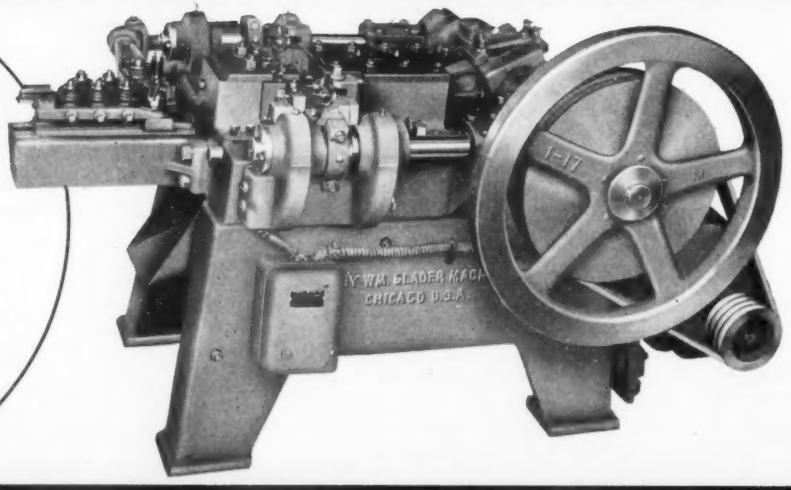
GLADER

HIGH SPEED WIRE NAIL MACHINES

HIGH TONNAGE OUTPUT—LOW MAINTENANCE COST

You can take care of increased production schedules and better product demands with these machines of established reputation.

For 55 years GLADER MACHINES have been giving HIGH QUALITY, LOW COST nail production.



Wm. Glader Machine Works 210 N. Racine Avenue Chicago 7, Illinois

Export Dept.: 122 E. 42nd Street, New York 17, N. Y.

Nussbaum Joins Loma

A. I. Nussbaum, who has been associated for a number of years with the Rolling Mill Division of the **Stanat Manufacturing Co.,** joined the **Loma Machine Manufacturing Co.,** New York, on January 1 as manager of its Rolling Mill Division.

★ ★ ★

Mr. Nussbaum wrote a two-part article on rolling mills and wire flattening machines for **Wire and Wire Products,** one being devoted to the theory of rolling and the other to the machines.

W. R. Grace Appointments

W. R. Grace & Co.'s Polymer Chemicals Division has announced that **Berndt K. Lyckberg** has been appointed General Manager of its new high density polyethylene plant in Baton Rouge, Louisiana. Mr. Lyckberg has been closely associated with the manufacturing of synthetic polymers related to oil refining operations and the plastics industry over the past seventeen years.

★ ★ ★

Since 1951, he has been manager of the chemical laboratories of **Firestone Plastics Co.** in Pottstown, Pa., one of the leading manufacturers of vinyl resins.

★ ★ ★

The Division also announced the appointment of **John Peterson** as Sales Manager, midwestern region, with offices in Chicago. He graduated from M.I.T. in 1942. He will sell the company's high-density polyethylenes.

Waterbury Farrel Elects New Director

Tadeusz Sendzimir was elected to the Board of Directors of **The Waterbury Farrel Foundry & Machine Co.** at its December meeting.

★ ★ ★

The Sendzimir name is known throughout the world's metals industry due to processes he has devised for galvanizing and cold and hot strip rolling. His cold strip mill in particular has gained renown in that no other process can roll metal so thin and so accurately regardless of width or hardness. Waterbury Farrel recently acquired from the **Armzer Company** its Sendzimir cold strip mill interests and the staff of Armzen joined that of Waterbury Farrel, to be known as the Sendzimir Mill Division, of which Division Mr. Sendzimir is Manager.

★ ★ ★

Mr. Sendzimir is owner and Director of the Sendzimir Company, including **Sendzimir Procedes** in Paris and **Sendzimir Ltd.** in London. His latest development is the planetary hot strip mill which reduces slabs of steel, alloy steel and other metals to hot rolled gauges in a single pass.

★ ★ ★

As a Director of Waterbury Farrel, Mr. Sendzimir succeeds the late **Irving H. Tolles** who, prior to his retirement, was a Vice President and Manager of the Rolling Mill Machinery Division.

CAMDEN WIRE CO., INC.

Wire Fabricators

Producers of Quality Fine Wire Copper Conductors

EXTRA FLEXIBLE CONDUCTOR STRANDED OR BRAIDED

MULTIPLE ENDS OF SIZES .008 to .002

BARE · TIN or LEAD COATED · SILVER PLATED

Special Heavy Tinned Conductors for Hook-up Wire

40 MASONIC AVENUE • **CAMDEN, NEW YORK**

Atlantic Steel Elects Officers

At a meeting of the board of directors of Atlantic Steel Company held on December 12th in Atlanta, **Robert S. Lynch** was elected chairman and chief executive officer and **Howard B. Johnson** was elected president. **Charles F. Stone,** board chairman since 1947, was named chairman of the Executive Committee. No other changes in officer personnel were made.

* * *

Mr. Lynch, a native of Vandergrift, Pa., is an alumnus of Ohio State University. He has been connected in various capacities with the American Sheet and Tinplate Company, United Alloy Corporation, and Republic Steel Corporation. He joined Atlantic Steel in 1944 as general superintendent. In 1946 he was made vice-president, and in January, 1947, was elected president.

Mr. Johnson was born in Tallapoosa, Georgia, and is a graduate of Georgia Institute of Technology. He joined Atlantic Steel in 1933 as an accountant. He later became order department manager and was named assistant secretary in 1945, and vice-president, finance and accounting, the following year. In 1949 he became vice-president in charge of sales and finance. He was elected to the board of directors in 1950 and in September, 1956, was named executive vice-president.

* * *

Mr. Stone, although born in Chattanooga, Tennessee, has been a life-long resident of Atlanta. A Georgia Tech graduate, he joined Atlantic Steel in 1910 in a sales capacity. He became general manager of sales in 1914, and in 1921 was named vice-president. He was elected a director and president of the company in 1932 and was named chairman of the board in 1947.

Allegheny Ludlum Elects Vice Presidents

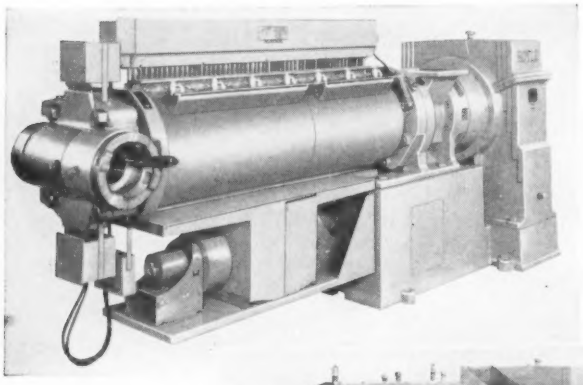
Announcement has been made by the **Allegheny Ludlum Steel Corp.,** Pittsburgh, of the election of three officers to new posts. These are **Carl B. Pollock,** Vice President in Charge of Manufacturing Planning and Policy; **Merle J. Graham,** Vice President—Production; and **Dr. Rush A. Lincoln,** Vice President and Technical Director. Mr. Pollock previously had been Vice President—Operations.

Wire Company Adds to Engineering Staff

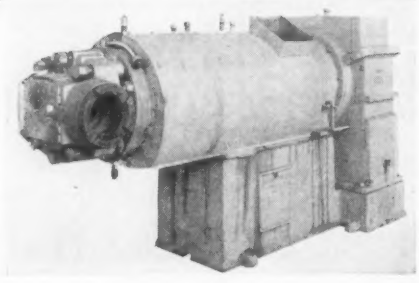
The appointment of **Herbert G. Haussig** to the engineering staff of **Johnston and Funk Titanium Corp.,** Wooster, Ohio, has been announced by **J. H. Johnston,** chairman of the board.

* * *

The increase in the technical staff of this producer of titanium wire is in line with the firm's ex-



8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.



EVER THINK OF UP-GRADING TO SPIROD®?

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — Hyde Park 2430 - 0456

Home Office — V. M. Hovey J. W. VanRiper — SHerwood 2-8262

Akron, Ohio — J. C. Clinefelter — BLackstone 3-9222

Los Angeles, Cal. — H. M. Royal, Inc. — LUdlow 9-3261

Tokyo, Japan — Okura Trading Co., Ltd. — (56) 2130 - 2149

panding activity in titanium and other vacuum melted metals.

★ ★ ★

Mr. Haussig, 40, a native of Heidelberg, Germany, was educated in Essen. He studied at the Natural Science Universities at Basel, Switzerland, and Marburg, Germany, and earned his master's degree in mechanical engineering at the Technical University, Berlin, in 1941.

Made Technical Director of Beryllium Corp.

The Beryllium Corporation, Reading, Penna. has announced the appointment of **Max C. Farmer** to the position of Technical Director.

★ ★ ★

Mr. Farmer, a graduate of Michigan College of Mining and Technology at Houghton, Michigan, was formerly General Superintendent, leaving in 1945 to work as Director of the Engineering Division of the Allied Commission in Rome, Italy. In 1947, Mr. Farmer was appointed Assistant Chief of the Engineering Division, **Aluminum Company of America.** Most recently, he has been employed as Staff Metallurgist on the Materials Advisory Board of the National Academy of Sciences in Washington, D. C.

Appointed to Sales Post by AS&W

William H. Guterl has been appointed assistant to the general manager of sales at the headquarters of American Steel & Wire in Cleveland, according to **M. D. Millard,** general manager of sales.

★ ★ ★

Mr. Guterl was born in Jersey City, N. J., in September, 1918. He attended Fordham University in 1936, majoring in finance and economics, later continuing studies in advanced accounting at Cleveland College.

★ ★ ★

His first job with the division was as defense regulation priorities analyst. He was advanced to sales analyst in the accounting department, and after two and a half years, was appointed sales statistics supervisor in 1950. He has headed this department up to his present appointment.

G.E. Man Promoted in Detroit

Herbert E. Ihrig, has been appointed manager of marketing administration and personnel development for **General Electric's Metallurgical Products Department,** Detroit, **George M. Hartley,** manager of marketing has announced.

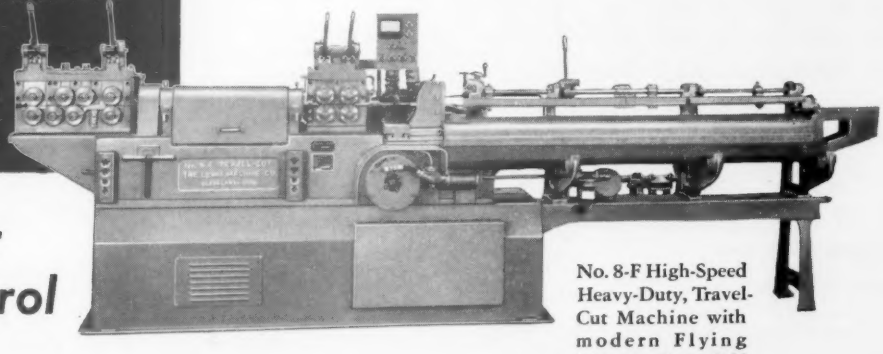
★ ★ ★

With the new appointment, Mr. Ihrig's duties are widened to include broad administrative duties in the department's marketing section, as well as those directly related to marketing personnel development and customer education activities.

WIRE STRAIGHTENING AND CUTTING with Air Clutch and Air Brake

for better quality control

● Greater accuracy with a minimum of spot swell is achieved through three important improvements on the famous Lewis Travel-Cut Wire Straightening and Cutting Machines . . . Wichita Air Clutch and Brake and Reeves Variable Speed Drive. There are 34 models in the Lewis line from .012″ to ¾″ rounds and shapes at speeds up to 200 FPM. Write for new brochure.



No. 8-F High-Speed Heavy-Duty, Travel-Cut Machine with modern Flying Shear Cut-Off Mechanism. Handles 5/32″ to 3/8″ dia. wire at speeds up to 200 FPM.

THE LEWIS MACHINE COMPANY

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Kesteloot Joins Whitney Blake

Announcement has been made by John B. Cook, President of the **Whitney Blake Co.**, wire and cable manufacturer, New Haven, of the appointment of **Walter W. Kesteloot** as assistant to the president.

★ ★ ★

Mr. Kesteloot has had twenty-five years experience in the wire and cable industry and until accepting his new position in New Haven was general manager of the wire and cable plants of **Electric Auto-Lite Company** in Port Huron, Mich., and Hazelton, Pa.

To Have Charge of Wire and Cable Division

Robert E. Valk, Vice President of **The Electric Auto-Lite Company,** has been appointed to take charge of the Wire and Cable and Foundry Divisions, it was announced by **J. P. Falvey,** Auto-Lite President. He will be responsible for the co-ordination of purchasing, manufacturing, engineering, and sales of the divisions.

★ ★ ★

The Wire and Cable Division has plants in Port Huron, Mich., and Hazleton, Pa., and the Foundry Division has plants in Toledo and Fostoria, Ohio and Mt. Vernon, Ill. Recently, the company made substantial capital improvements in the Wire and Cable Division that have increased the product capacity of magnet wire for industrial use and of aircraft wire.

Crucible Steel Appointment in Spring Division

Charles E. Knox has been appointed manager of the newly-created process engineering and production control department of the Spring Division, **Crucible Steel Company of America,** Pittsburgh, according to an announcement by **Thomas T. Crowley,** general manager of the division. Organized to provide improved service to customers, the new department is responsible for steel procurement, inventory control, scheduling, standard processing methods and industrial engineering functions.

★ ★ ★

Mr. Knox started his career with Crucible in 1950 as an industrial engineer at the company's Park Works.

R.B.&W. Names Two to New Technical Sales Posts

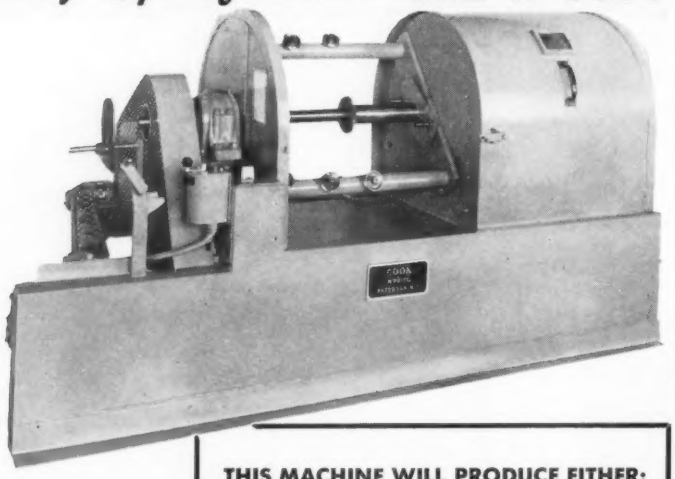
Duke A. Garrison and **Frederick E. Graves** have been appointed to new technical sales posts as assistants to the vice president in charge of engineering and research, **Russell, Burdsall & Ward Bolt and Nut Co.** The announcement was made by **Harry O. McCully,** vice president in charge of sales.

★ ★ ★

Mr. Garrison will have his office in R B & W's Chicago office and Mr. Graves, in the company's Port Chester, New York, headquarters. Both men will work with **John S. Davey,** vice president in charge of research and engineering, in providing technical assistance to fastener users.

A COOK BUNCHER — STRANDER

Your Answer to the New Military Specification: **MIL-W-5086**



takes less space

Models Available	Capacity
BH-8	45 lbs.
BH-12	90 lbs.
BH-16	200 lbs.
BH-22	500 lbs.
BH-24	1000 lbs.

Write today, for descriptive literature giving details of construction and performance

THIS MACHINE WILL PRODUCE EITHER:

Concentric Wire—Where layers are made up of wires in opposite direction of lay.

Semi-Concentric Wire—Where layers are made up of wires in same direction but with different lay to prevent strand locking.

- **HIGH SPEED**
- **SINGLE TWIST FLYER**
- **AUTOMATIC LAY CONTROL**
- **LARGE TAKE-UP REEL**

A Complete Line of Quality Machinery For The Wire and Cable Industry To Meet Rigid Specifications.

COOK MANUFACTURING CO.

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Appointed Chief Chemist by National Electric Products

Announcement has been made by **National Electric Products Corp.**, Pittsburgh, of the appointment of **Robert Lyle** as Chief Chemist for the company at its wire and cable plant at Ambridge, Pa.

Rea Magnet Wire Elects Officers

The directors of **Rea Magnet Wire Company, Inc.**, Fort Wayne, Ind., have announced the election of **Samuel A. Rea** as chairman and treasurer, **David W. Rea** as president, and **James L. McKinley** as general sales manager.

★ ★ ★

Samuel Rea and **David Rea** had previously served as president and vice president respectively. Mr. McKinley joined the company in January, having had 20 years of experience with leading manufacturers in the electrical industry, mostly in sales capacities.

Ransohoff Appoints New Engineering Head

The appointment of **Bernard S. Reckseit** as Chief Engineer is announced by Ransohoff, Inc., Hamilton, Ohio, one of America's oldest manufacturers of metal cleaning and finishing equipment and systems.

★ ★ ★

He is a graduate of M.I.T. and has served as a Mechanical Engineering Consultant to Industry. He joined Ransohoff in 1947 as Engineering Assistant to the President and assumes his new position following the death of **Nathan Ransohoff**, founder, Chairman of the Board and Chief Engineer.

Named Assistant to the President At Heli-Coil

John Rabuse has been appointed Assistant to the President for the **Heli-Coil Corp.**, Danbury, Conn., according to an announcement by **Eduard Baruch**, President.

★ ★ ★

Mr. Rabuse has been associated with the firm since 1945, serving as manager of customer service and sales manager in charge of the original equipment market.

To Manage Research for Escambia Chemical

Robert G. Reed has been appointed business manager of **Escambia Chemical Corporation's** research division, it was announced by **Dr. N. C. Robertson**, vice president and director of research.

★ ★ ★

Mr. Reed will be responsible for the business functions and the non-technical administration of Escambia's research department.

★ ★ ★

Prior to Joining Escambia, he had been associated with National Research Corporation since 1942. He received his B. A. degree from Harvard University in 1936.

NORBIDE* Abrasive Grain...

Ready to cut Your Refinishing Costs!

Wire men who have switched from costly diamond dust to NORBIDE Abrasive for refinishing dies are amazed at the savings. They have found NORBIDE Abrasive — the hardest manufactured abrasive commercially available—ideal for ripping and semi-finishing operations. Whatever your requirements, we can supply you promptly from stock.

For details and prices on this cost-cutting abrasive, write for form 559, NORTON COMPANY, 45 New Bond St., Worcester 6, Mass.

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BORON CARBIDE
Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories.
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*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

NORBIDE* | *The hardest manufactured abrasive commercially available!*

Appointed Vice-President of Heli-Coil

Leo J. Brancato has been appointed a vice-president of the **Heli-Coil Corp.**, Danbury, Conn., manufacturers of wire thread inserts.

★ ★ ★

Mr. Brancato, chief engineer in charge of product development and research for the company since October 1954, will continue to head the Engineering Department along with his new corporate duties. He is a graduate of Cooper Union and holds a Master of Science degree in Mechanical Engineering from Columbia University. Mr. Brancato is a member of The Wire Association.

Francis P. Leahey

Francis P. Leahey, 58, Executive Vice President of the **Nichols Wire & Aluminum Co.**, Davenport, Iowa, died December 27 after a brief illness.

Mr. Leahey had been scheduled to assume the post of Deputy Director of the Aluminum and Mag-

Francis P. Leahey

nesium Division of the Department of Commerce in Washington, D.C., December 1.

★ ★ ★

He began his career in 1920 with the **American Steel & Wire Co.**, Worcester, Mass., where he was Superintendent of the Wire Mill from 1934 to 1941. He was later transferred to their Cuyahoga Works in Cleveland as Superintendent of the Wire Mill. In 1942 he resigned to become General Manager of the **Spencer Wire Co.**, West Brookfield, Mass. He joined the **Nichols Wire & Aluminum Co.** in 1946.

Silicone Products Department Reorganizes Sales Force

Reorganization of the sales force of the Silicone Products Department of **General Electric Company** and the creation of two new sales districts has been announced by **T. C. Ohart**, department manager of marketing.

★ ★ ★

The new district managers are **Milton C. Lauenstein**, heading the Chicago Sales District and **Robert T. Daily**, heading the Western Sales District with headquarters at Los Angeles.

★ ★ ★

Jerome T. Coe, sales manager,

Far greater production in less space with lower cost equipment . . . for all steel and non-ferrous wire.
The fastest, most uniform way to heat treat wire* is often far lowest in cost!
AJAX
HULTGREN
electric SALT BATH furnaces
* Write for case history bulletins on Ajax Electric Salt Baths for
Annealing
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ASSOCIATED COMPANIES
AJAX ELECTRIC FURNACE CORP. • AJAX ELECTROTHERMIC CORP. • AJAX ENGINEERING CORP.

explained the reorganization was necessitated by continued growth in silicone sales and the increasing variety of commercially available silicone products of all kinds. He said the new organization will permit better geographical coverage, closer customer contacts and greater specialization by salesmen in the department's product line of silicone rubber, resins, fluids, emulsions and specialties.

★ ★ ★

District offices at Cleveland and Newark will be continued. Except for increases in manpower, no changes have been made in sales offices for salesmen and materials engineers in Boston, New Haven, Philadelphia, Charlotte, N. C., Detroit, Dallas and at Waterford, N. Y.

Rope Company Elects Officers

The following officers of the **E. H. Edwards Co., South San Francisco** manufacturers of wire and wire products, were re-elected at the annual, year-end meeting of the Board of Directors: **George Wagner,** Chairman of the Board; **Sterling Edwards,** President and General Manager; **Kermit Williams,** Executive Vice President and Treasurer; and **Russell F. Hendrick,** V. P. in charge of Sales. **James Hunter,** who holds no office with Edwards, was also re-elected to the Board.

★ ★ ★

Mrs. Cynthia Williams, Secretary of the firm, was named to the Board, replacing **Mrs. A. M. Doyle** who is retiring after more than forty years of service in various capacities with the company.

★ ★ ★

Maynard Garrison, S. F. attorney, was also elected a Director. He replaces **C. A. Vander Pyl,** who retires after 25 years with Edwards.

★ ★ ★

Speaking for the Board, Kermit Williams stated that the company has recently completed a product diversification program designed to broaden the base of its service to western industries. He added that the firm will place heavy emphasis on selling and merchandising in the year ahead.

LaSalle Steel Appointments

The appointment of **Andrew L. Rowe** as Assistant to the President of **La Salle Steel Company** was announced by **Thomas A. Kelly,** President of the cold drawn steel bar firm. Mr. Rowe, until recently, was a Vice-President of the **Elgin National Watch Co.,** with whom he had been associated for some 22 years.

★ ★ ★

At the same time announcement was made by Mr. Kelly of the promotion of **Thomas J. Moore, Jr.,** Director of Purchases at La Salle for the past year, to the post of Director of Product Planning.

★ ★ ★

Succeeding Mr. Moore as Director of Purchases will be **Phillip H. Smith,** who came to La Salle in January, 1956, as a staff metallurgist after a 3-year period with Inland Steel Company.

Next Spring — in May — will be held

THE CANADIAN REGIONAL MEETING

May 13-14, 1957 — Royal Connaught Hotel — Hamilton, Ontario, Canada

The Program Committee, headed by Allan B. Dove, Research Supervisor, Steel Company of Canada Ltd., has announced that there will be papers of general interest, as well as technical papers on ferrous and non-ferrous topics.

Plans have been made for plant visits to the Parkdale Works of The Steel Company of Canada in Hamilton and the Federal Wire and Cable Company at Guelph, Ontario. Full program details will be published next month.

All wire men are cordially invited to be present at this fine Regional Meeting.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET • **STAMFORD, CONN.**

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,772,701, PROCESS AND APPARATUS FOR THE MANUFACTURE OF WIRE NETTING, patented December 4, 1956 by Heinrich Wilhelm Brune, Herbert Hädrich, and Kurt Böhm, Dorsten, Germany.

More specifically, the invention relates to the welding of the crossed wires of the wire netting, employing a revolvable wheel with an annular fixed welding plate connected to one side of the wheel and provided with circumferentially spaced wire-receiving recesses in its outer surface, and movable welding electrodes for association therewith.

★ ★ ★

No. 2,772,989, TREATED WIRE FOR ARC WELDING ELECTRODES, patented December 4, 1956 by Edward R. Gamberg, Irwin, and Howard C. Ludwig, Pittsburgh, Pa., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania.

A consumable welding electrode is provided particularly for use in welding in open air as distinct from welding in an inert gas atmosphere consisting of a homogeneous metallic wire core of either iron, nickel or alloys consisting essentially of iron and nickel, having on its surface a layer of a dissociable oxygen containing an arc stabilizing compound of metal oxides or metal phosphates, this layer having on its surface a flux coating which during the welding operation, prevents oxidation of the weld, the compound being in intimate contact with the surface of the core and being present in sufficient thickness to stabilize the arc without producing oxidation of the weld considering the diameter of the core.

★ ★ ★

No. 2,773,519, BARB WIRE MANUFACTURE, patented December 11, 1956 by Neil J. Ranney, Euclid, Ohio, assignor to Wean Equipment Corporation, Euclid, Ohio, a corporation of Ohio.

★ ★ ★

A twisting and coiling mechanism is disclosed including a rotatable yoke for association with a coiling member rotatable within and coaxial with the yoke and holding a spool for coiled material. Rotation of the yoke and member will twist the wire and coil it upon the spool. Eight claims.

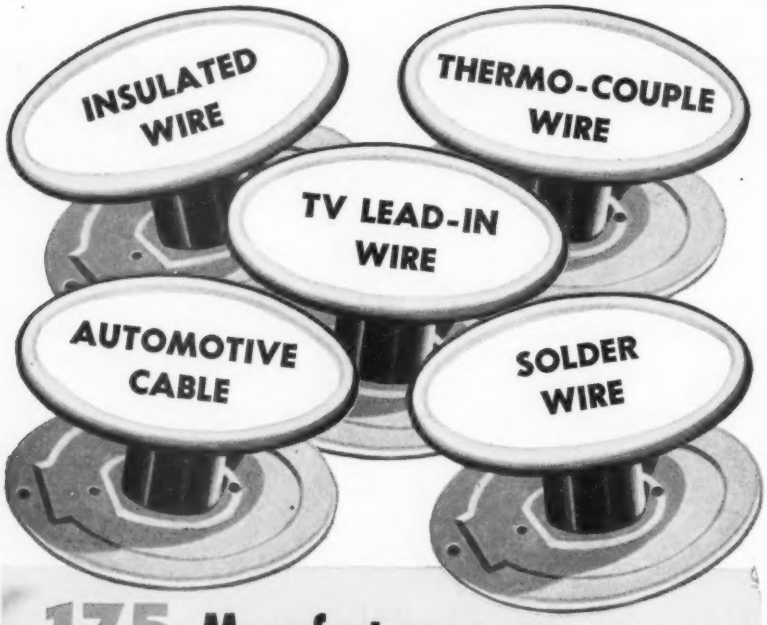
★ ★ ★

No. 2,773,543, COUPLING CONNECTION FOR WIRE SPRING STRUCTURES, patented December 11, 1956 by William C. Sandor, Solon, Ohio, assignor to The Universal Wire Spring Company, Bedford, Ohio, a corporation of Ohio.

The structure includes two elongated wire members removably, non-rotatably coupled with each other, a sharply curved open loop in one of the wire members, and an S-shaped loop in the oher one, this S-shaped loop including three parallelly arranged cross-bars the other ones of which are spaced from each other a distance less than the outside diameter of the sharply curved open loop in the one wire member, the S-shaped loop having the cross-bar between these two outer cross-bars extended through the sharply curved open loop in this one wire member and yieldingly hugging with the two outer cross-bars the outside wall of the open loop.

★ ★ ★

No. 2,773,651, COIL WINDING APPARATUS, patented December 11, 1956 by Richard R. Whipple, Haverhill, Mass., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.



175 Manufacturers say MASON Spools are best—for less!

These manufacturers specify Mason lightweight, non-returnable, lithographed Spools for performance, appearance and cost!

And while Mason Spool performance speaks for itself, the appearance of Mason Spools speaks for *you* with rich, colorful lithography that assures *instant brand recognition.*

Mason lightweight, non-returnable Spools are available in 5″, 6½″, 8½″ and 10½″ head sizes. All sizes are available with 1⅜″ (Dia.) barrels. The 10½″ head size is also available with a 3½″ (Dia.) barrel. Barrel lengths from ⅝″ to 14″.

Let us know about your spool requirements *now!* Telephone East Providence 1-2810 or write to the address below.

MASON CAN COMPANY

1949 Dexter Road, E. Providence 14, R. I.

Branch Plant — Greenville, Ohio

The apparatus is for winding turns of a wire strand on an arcuate segment of a toroidal core which is moved so that successive cross-sectional portions thereof are moved into a winding position to receive turns of wire. A hollow rotating motor shaft is associated therewith to receive the wire and guiding it to a grooved flyer at an end of the shaft which, in turn, guides it to a position in the plane of each cross sectional portion of the core segment.

★ ★ ★

No. 2,774.407, METHODS OF AND MACHINES FOR WINDING SPIRAL SPRINGS, patented December 18, 1956 by Willem J. B. Jansen, Paris, France.

★ ★ ★

The method of winding spiral springs, utilizing a series of successively arranged abutments having flat frictional surfaces inclined with respect to each other is disclosed. There are seven claims.

★ ★ ★

No. 2,775,266, APPARATUS FOR INTERTWISTING WIRES, patented December 25, 1956 by Armin F. Fick, Downers Grove, Clarence R. Rasmussen, La Grange, and Harry C. Thayer, Jr., Maywood, Ill., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

For interconnecting two wires, these inventors provide an apparatus including a rack reciprocable through two predetermined strokes in opposite directions to rotate a gear alternately in opposite directions through a predetermined number of revolutions whereby one pair of wires may be twisted during movement of the rack in one direction and another pair of wires may be twisted during movement of the rack in the opposite direction while held by specially provided gripping devices.

Wire Weaving Plant Moved to Larger Quarters

Nico Wire Cloth Corp. recently moved into a new and larger plant at 1225 W. 26th St., Houston 18, Texas. The concern manufacturers insert screen wire.

★ ★ ★

At the same time O. J. Cook, Vice President, announced that the staff has been increased and that **Irving M. Ritchie** has joined the company as General Sales Manager. The expansion of both staff and manufacturing facilities will enable Nico to serve its customers more expeditiously.

Resin Industries Announces New Eastern Facilities

Announcing two important moves, **Resin Industries,** Santa Barbara, Calif., subsidiary of **The Borden Company,** forecasts a growing west-to-east expansion. Resin Industries has long been known as an important extruder of PVC and more recently as a specialized compounder of vinyl for a wide range of extrusion, molding and calendering operations.

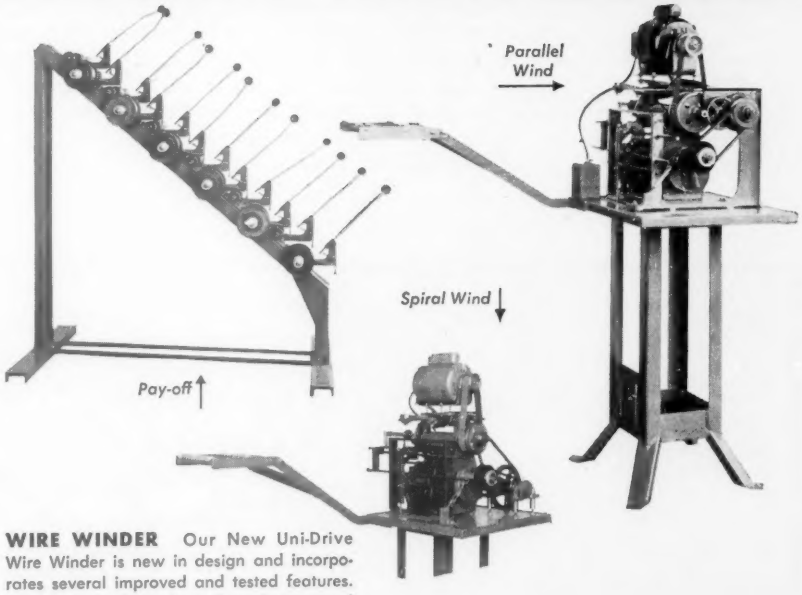
★ ★ ★

The company has acquired a Leominster, Mass., plant of 21,000 sq. ft., duplicating to a large degree the Santa Barbara operation. Production of the new unit will consist of specialized and custom extrusions, along with compounding of PVC resins and copolymers, for the use of manufacturers of vinyl insulated wire and cables. Modern quality control laboratory facilities are being installed. Move in of equipment was started in the Fall, with initial production scheduled for January, 1957. Peak planned production will be achieved by January, 1958.

★ ★ ★

To serve eastern areas, Resin Industries has opened an eastern sales office at Stamford, Conn. The new office is to be under the direction of **Allan W. Stephens,** who

STANDARD UNI-DRIVE WIRE WINDER



WIRE WINDER Our New Uni-Drive Wire Winder is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel — no over or under-winding. Can also be furnished with a slight spiral pattern for winding exceedingly fine wire. Automatic Stop Motion controls each strand. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors.

Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAY-OFF Our Pay-off Attachment consists of a heavy fabricated frame on which Pay-off spools are mounted to cover desired number of ends to be wound. Equipped with spindles, running on self-aligning ball bearings, with size of spindles and adapters to accommodate customers' pay-off spool. Compensating Attachment to control the tension of each individual strand of wire, applying the same tension when spool is full as when empty. Can also be adapted for use with bunching machines.

STANDARD MILL SUPPLY COMPANY
31 ESTEN AVENUE PAWTUCKET, R. I., U. S. A.

formerly managed sales in the East from Santa Barbara. Customer relations for Borden PVC compounds as well as extruded products will be handled.

Wire Forming Equipment Announced

The Larkin Welder & Machine Corp., 155 East 44th St., New York 17, N. Y. has announced a line of forming equipment for making wire products.

★ ★ ★

These include:

1. **Wire Frame Machine to form and weld wire frames automatically. Complete frames produced in about 3 seconds each.**
2. **Resistance welders for butt, flash, spot, projection and seam welding.**
3. **Machine to form and weld slab bars and rod for reinforced concrete construction.**
4. **Machine to pour and weld tie-block reinforcing wire for building construction.**

★ ★ ★

Complete details on any or all of this equipment may be procured by writing the company.

Introduces Copper-Plated Communications Wire

Development of a new type communications wire of high-strength steel with a heavy copper coating was announced in January by **National-Standard Co.**, producer of specialty wires for industry. It is in limited commercial production at the company's Niles, Mich., plant, where copper plating of steel wire was started three years ago.

★ ★ ★

Although the biggest volume application of the new product is expected to be in telephone, telegraph and railroad signal lines, the wire will meet multiple requirements of high tensile strength (up to 250,000 psi), electrical conductivity, bright finish and resistance to fatigue and corrosion. The copper coating is joined to the steel core in a permanent bond that permits twisting, stranding, weaving, braiding, bending or flattening the wire without rupturing the bond.

The new wire is an addition to National-Standard's Copperply line and is available in two grades, 30 and 40 per cent conductivity, in both high and extra high strength classes. Earlier Copperply wire, introduced in 1953, contains 5 and 10 per cent of copper by weight. Its primary applications have been television antenna lead-in wires, tinsel, jewelry chain and building tie wire.

★ ★ ★

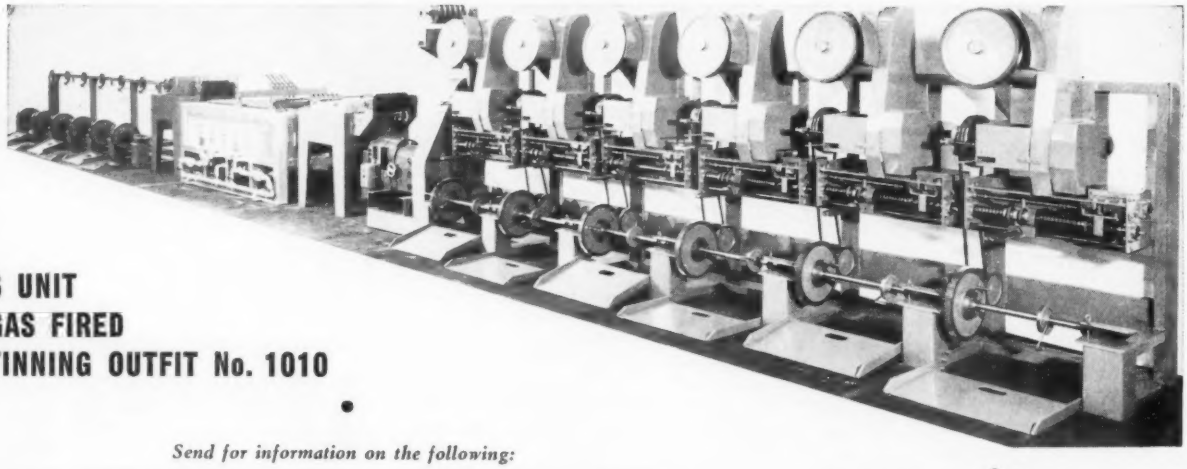
Further information can be obtained from National-Standard Company, Niles, Mich.

Bethlehem Produces New Movie

Bethlehem Steel Company released its newest film, **"The Long Pull,"** telling the story of modern custom-made steel wire in 28 minutes.

★ ★ ★

The film depicts a score of representative products made from steel wire, illustrating the manufacturing processes each must undergo.



6 UNIT
GAS FIRED
TINNING OUTFIT No. 1010

•

Send for information on the following:

WIRE ANNEALING, TINNING and GALVANIZING OUTFITS

MULTIPLE or SINGLE UNIT WIRE TAKE-UPS

FINE WIRE DRAWING MACHINES

MAGNET WIRE ENAMELING EQUIPMENT, INCLUDING

PRE-ANNEALERS, SYNTHETIC ENAMEL APPLICATORS and CIRCULATING SYSTEMS

COTTON, GLASS-FIBRE and TAPE COVERING MACHINES

EST. 1855 AIMCO INC. 1915

"American" AIM INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.

It includes wire cloth, barbed wire woven fencing, tire chains, fan guards, household brushes, auto seat springs, furniture coil springs, screws, nails, bolts and nuts, rivets, reinforced concrete pipe, chain link fencing, and submarine telephone cable.

★ ★ ★

Shooting locations included three Bethlehem plants, Sparrows Point, Md., Johnstown, and Lebanon, Pa., and wire consuming industries in six states.

New Turks Head Catalog

The Fenn Manufacturing Co. of Newington, Conn., producer of metal forming equipment, has published a new catalog illustrating their complete line of Turks Heads. The two-color catalog contains basic technical information, principles of operation and advantages as a precision production machine; and explains many typical wire shaping applications. Profusely illustrated, the catalog details the outstanding features of Fenn Turks Heads and includes specifications of types, sizes and technical operating data. Typical tandem arrangements and accessories are also included and explained. For a copy of this catalog (No. TH56), write to: Fenn Manufacturing Co., Fenn Road, Newington, Conn.

Selector Guide for Heat Resisting Alloys

A new Selector Guide for high temperature, heat-resisting alloys is now available from **Techalloy Company, Inc.**, Rahns, Pa.

★ ★ ★

This chart gives useful data on comparative strengths at high temperatures, scaling resistance, individual characteristics and comparative prices. Alloys covered by Selector Guide are Inconel, Inconel X, Incoloy, Techalloy 80 Ni 20 Cr, Stainless and Heat-Resisting Steels: Types 330, 310, 314, A-286 and N-155.

Free copies of Selector Guide are available directly from the company.

West Coast Firm to Represent Eastern Wire Mills

Announcement has been made by **John M. Cooner,** General Sales Manager, **Bucky Harris Co.,** Los Angeles, Cal., of the company's appointment as West Coast mill representatives for **International Wire Products Co.** of Midland Park, N. J.

★ ★ ★

International draws fine wire of stainless steel monel, inconel and various nickel and precious metal alloys. Additional products include silver-plated copper wire, tinned wire, bunched and concentric stranded wire. Currently, International is expanding its facilities at Midland Park to encompass such new products as Lock Wire and Safety Wire, widely used by the Southern California aircraft industry.

The Difference
IS HERE.....
NEW MPS CONVOLUTE DURA CURL RIMS...
The difference between just any spool or reel and Superior MPS CONVOLUTE DURA CURL Rims is well worth your close attention. Because now, with this exclusive MPS feature, maximum strength and rigidity are obtained throughout the reel heads. You can now have continuous trouble free high speed winding, without spool straightening expense. These new MPS spools also have the famous No-Crev feature.
Ask about MPS CONVOLUTE DURA CURL RIMS today. We invite your inquiries.
18 West St., Attleboro, Massachusetts, U.S.A.
Telephone Attleboro 1-0848
Mossberg PRESSED STEEL Corporation
MPS
CONVOLUTE
Dura Curl
Spools & Reels
give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to help you!
#110

Simultaneously, Mr. Cooner announced the appointment by **Springfield Wire and Tinsel Co.** of Bucky Harris as its West Coast mill agents.

★ ★ ★

According to **Victor J. Wagner,** Springfield's Vice-president, the company makes a unique line of high temperature silicone rubber insulated lead wire, of interest to the guided missile industry. It is reported that Springfield has successfully introduced the only silicone rubber insulation with sufficient strength to be used without a protective braid. The product is rated at 200°C for continuous operation.

Phifer Wire Products Now in New Home

Phifer Wire Products, manufacturers and suppliers of aluminum and galvanized insect screening, moved recently into a new plant in Tuscaloosa, Alabama, adding many thousand square feet of floor space to their operation.

According to the announcement by **Gordon Lawless,** general manager, the Phifer firm has completed its move to its new location and production is back to normal.

★ ★ ★

The company was originally known as the Phifer Aluminum Screen Company, and began manufacturing aluminum insect screening in a converted warehouse shortly after World War II. As new looms and wire drawing machines were added, the company began to outgrow its physical plant. To meet the critical need for increased production, construction of a modern masonry building was begun last Spring to supply the increasing demand from manufacturers and jobbers over the nation.

★ ★ ★

A separate wire drawing plant is attached to the main plant and contains the very latest equipment for drawing wire to size. Coupled with the most modern weaving and finishing methods, this equipment enables Phifer to produce uniformly perfect insect screening 24 hours a day.

Revonah Purchases Mummert-Dixon Company

James F. Malcolm, President, **Revonah Spinning Mills,** announced that Revonah has acquired the entire stock of the **Mummert-Dixon Company** of Hanover, and will operate the company as a subsidiary.

★ ★ ★

The Company manufactures wire cloth machinery, grinders, facing and boring heads and special machinery: they also run a complete individual shop for building all types of wood patterns.

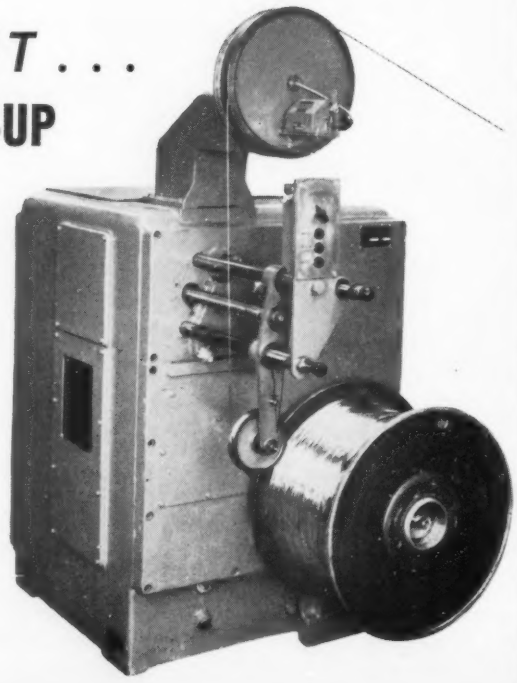
★ ★ ★

Management will be under the supervision of **Charles A. McGough, Jr.** who will be President of the Company. Mr. McGough has been associated with the Electric Service Manufacturing Co., Philadelphia for a number of years. He

NEW...
VERSATILE...
EFFICIENT...

POURTIER NO. 2 TINNING TAKE-UP

— Same use as the well-known n° 1 Take-up but completely electrically regulated.
— Drums up to 30" flange diameter.
— Wires from 7 to 26 A.W.G.
— No capstan.
— Constant linear speed (choice of speed with a potentiometer).
— No over-tension.
— Low speed motion allowing spiralling out of drum (for further welding).
— Air pressured unloading device.



POURTIER MACHINES

153, rue Général Galliéni

ROMAINVILLE (Seine) FRANCE

came to Hanover as manager of their tool manufacturing plant which had operated in Hanover as the Peerless Equipment Co. During the past several years he has been manager of the Company's tool division in charge of sales with general supervision over engineering, advertising and production. He is an electrical engineer and professional engineering graduate of Villanova College and Heidelberg University, Germany. At the present time he serves as a consulting engineer to the Association of American Railroads.

★ ★ ★

Samuel B. Fortenbaugh, Jr., Secretary-Treasurer of Revonah and **Wall Rope Works,** New York, will also hold this position in the Mummert-Dixon Co.

★ ★ ★

The Mummert-Dixon Company was founded as a pattern shop by **Ervin S. Mummert,** who later became associated with **Joseph O. Dixon** in the designing and manufacturing of the present products of the company. The company was incorporated in 1907. Operations will continue under the same name with all present personnel.

★ ★ ★

Sales effort and customer service on the present line of products will be increased and engineering studies are being instituted to improve the products; later other items will be added to the line of equipment being manufactured.

★ ★ ★

Revonah was organized in Hanover in 1926 for the manufacture of Jute Carpet Yarns. The Company is now known world wide and has a leading place in the industry.

★ ★ ★

The present officers of Revonah are as follows:

James F. Malcolm,
President and General Manager
Rober F. Fitzpatrick,
Vice President & Sales Manager
Samuel B. Fortenbaugh, Jr.,
Secretary-Treasurer

New Aircraft Conductor Announced by Revere

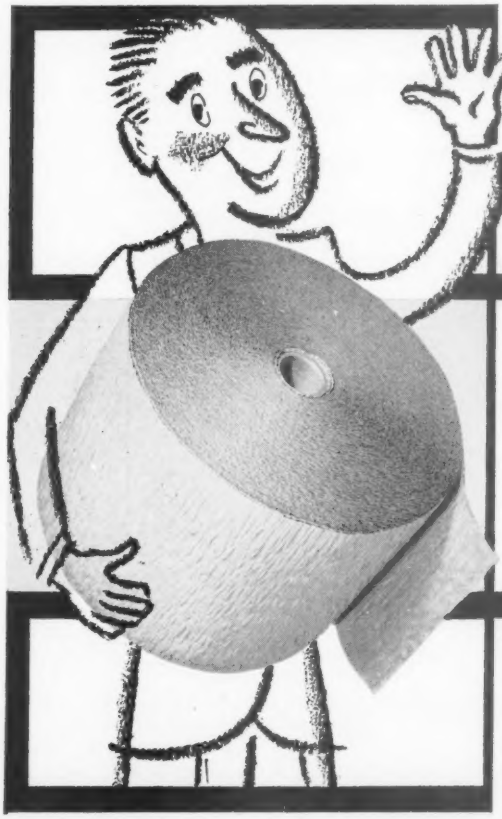
A series of single conductor, 600 volt, high-temperature aircraft hook-up wires, designed to meet applicable requirements of Military Specification MIL-W-7139, are described in Bulletin No. 1906, **Revere Corporation of America,** Wallingford, Conn.

★ ★ ★

These wires are said to possess outstanding dielectric characteristics over the continuous temperature operating range from —68°F. to +410°F. Available in sizes from 22 to 12 gauge, the wires are insulated with teflon and teflon-impregnated glass to form a rugged insulation highly resistant to abrasion and corrosion. The insulation is readily stripped and impervious to most chemicals and solvents.

Bulletin on Haveg's "Teflon" Products

Haveg Industries, Inc., announces the publication of a 4-page bul-



HERE ARE 5 GOOD REASONS FOR USING Rinkle Krinkle Spiral Wrap

1. Only No. 1 Northern Kraft Paper is used in the manufacture of Rinkle Krinkle Spiral Wrap.
2. Rolls can be supplied in any weight, width, or diameter.
3. It is manufactured by a company that has 30 years experience making spiral wrap **exclusively.**
4. Items wrapped with Rinkle Krinkle Spiral Wrap are very attractive, which greatly increases sales appeal.
5. Five types available include Krinkle Kraft, Krinkle Waxo, Krinkle Waterproof, Krinkle Nylon Reinforced, and Krinkle Resin Laminated.

If you use Rinkle Krinkle Spiral Wrap once, you will want to use it every time.

Rinkle Krinkle Paper Company

MEMBER WAS

326 A STREET, BOSTON 10, MASS.

letin on "Teflon"* as it applies to their products.

★ ★ ★

The illustrated brochure, T-50, the first of a series, covers this new plastic resin as a material. It details "Teflon's" exceptional properties: inertness to practically all chemicals, excellent dielectric properties, resistance to a wide range of temperatures, low friction characteristics, and weather resistance. "Teflon," in fact, is a material which can be utilized wherever corrosion resistance, surface properties or electrical resistance is a factor.

★ ★ ★

These products, assuring an almost limitless service life, include thin-and-heavy-walled tubing and rod, steel pipe lining, insulated wire, machine parts and sheet.

★ ★ ★

Bulletin T-50 is available from Halocarbon Division, Haveg Industries, Inc., 900 Greenbank Rd., Wilmington 8, Del.

* Du Pont tradename.

New Service Shop in East for Carboloy Products

The Metallurgical Dept. of General Electric Company has announced the opening of a new Service Shop for Carboloy cemented carbides at 760 Colfax Avenue, Kenilworth, New Jersey.

★ ★ ★

This shop will be able to fill orders for special shape blanks in semi-standard or special pieces of cemented carbides in a week or less. The office, under the direction of **R. J. Mason,** will serve New Jersey, Eastern Pennsylvania and New England.

Expands Carbide Tool Line to Include Drills, Reamers

The abrasives division of **Elgin National Watch Company** announces it is adding a complete range of precision ground solid carbide drills and reamers to its rotary tool line.

The new tools will bear the Elgin "Golden Circle" name, which already includes carbide end mills and rotary burs, it was announced by **William H. Baudouine,** abrasives division sales manager.

★ ★ ★

Twist drills will range in size from No. 60 wire gage to ½ inch in diameter, and reamers from .050 to ¾ of an inch, he said.

★ ★ ★

The abrasives division also markets Elgin diamond compounds and Elgiloy, highly corrosive-resistant spring alloy, in the industrial field.

Canadian Wire Company Moves

The Western Wire and Cable Company, Ltd. has announced that it has moved in the same city to a new address at 12357 - 127th Avenue, Edmonton, Alberta, Canada. The company formerly was located on 101st Street.

NON-FERROUS STATISTICS

METAL AND COPPER - Refined metals consumed in mill products 1/ in 1955 and in 1956, by months, and stocks of refined copper at end of period, gross weight in short tons

Period	Consumption						Stocks of refined copper	
	Wire mills	Brass mills						
	Refined copper 2/	Refined copper 2/	Refined lead	Primary pig tin	Refined nickel	Slab zinc	Wire mills	Brass mills
1955 3/	812,663	647,044	3,443	1,055	3,527	133,737	22,387	42,528
1956:								
January	77,293	65,519	300	135	368	12,203	19,102	33,173
February	71,838	63,703	345	138	411	11,680	18,900	34,268
March	82,678	60,542	329	128	368	11,884	17,875	40,272
April	81,871	60,035	291	112	366	11,800	20,737	42,232
May	82,270	58,625	246	95	342	11,381	23,586	45,274
June	79,013	44,110	177	67	403	7,475	28,480	51,566
July	45,301	31,771	115	56	319	4,578	31,686	58,738
August	71,183	48,529	203	87	425	7,694	31,852	49,503
September	67,635	43,515	191	98	450	7,498	30,668	43,501
October	74,751	48,616	200	96	384	4/ 9,128	45,422	42,823
November	65,569	44,343	180	(5)	(5)	8,312	43,059	49,276

1/ Data cover operations of 17 wire mills and 57 brass mills.
2/ Detailed information on consumption of refined copper is published in the Monthly Copper Report.
3/ Final figures.
4/ Revised.
5/ Not available.

Hubbard and Hamelin Join in Forming New Canadian Firm

The Hubbard Spool Company, Garrett, Ind., and the **Hamelin Lumber and Woodwork, Ltd.,** Lachine, Que., Canada, have announced the formation of Hubbard & Hamelin Enterprises, Ltd. in Lachine, for the purpose of manufacturing a more complete line of spools, reels and related items for the wire and cable industry in Canada. The move was made to provide better and faster service at lower cost to their customers. Products made will be metal bound reels, flanged steel traverses for cable reels, expendable magnet wire reels with molded flanges, a complete line of steel, plastic and fibre spools and reels and other related items for the industry.

Wire Notes from Abroad

India: Eight firms have been licenced to add various products to their lines. These are: **Indian Telephone Industries Ltd.,** Duravani Nagar, Bangalore—bolts, nuts and screws; **Guest, Keen and Williams Ltd.,** 41 Chowringhee, Calcutta—bars and rods; **Macrosteels Ltd.,** 10 Graham Rd., Bombay—bolts; **Bengal Screw Mfg. Co. Ltd.,** 2 Clive Rd., Calcutta—wood screws and rivets; **Universal Screw Factory,** G. T. Road, Amritsar, Punjab—bolts, nuts and wood and machine screws; **Hindustan Electric Co. Ltd.,** Graham Rd., Bombay—aluminum conductors; **South India Rubber Works,** 211 Nagdevi St., Bombay—rubber insulated wire; **National Insulated Cable Co., of India Ltd.,** Dalhousie Sq., E., Calcutta—ACSR conductors, VIR cables and cotton-paper covered wire; and **Osler Cable Co. Ltd.,** 12 Old Court House St., Calcutta—bare copper and paper insulated conductors.

★ ★ ★

South Africa: L. Lopis & Sons (Pty.) Ltd., Johannesburg, is broadening its line of bird cages and producing chromium plated cages for the first time.

★ ★ ★

Tangier: This has always been a center for warehousing steel, wire and wire products, but due to unsettled conditions, these stocks have been transshipped to various points in Europe for distribution.

★ ★ ★

Portugal: This country will import about 40% of its needs of wire and wire products in the year ending June 30, 1957, as against 34% the previous year. Wire mesh is a large item.

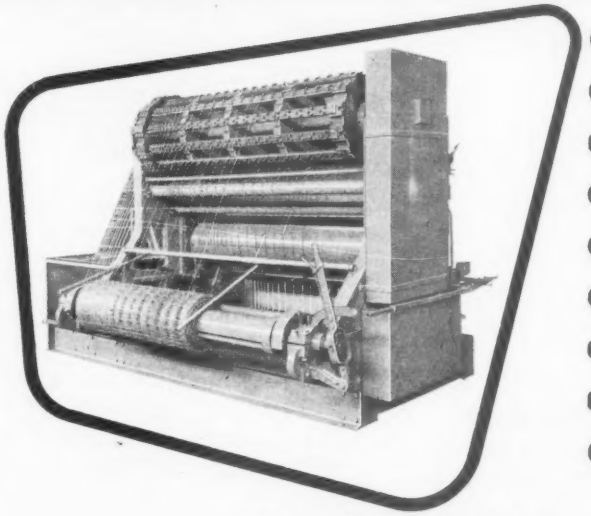
★ ★ ★

Spain: Nail making equipment is to be made here for the first time and other wire processing machinery will be added from time to time. Spanish rod production has been increased about 13% to an annual rate of 86,000 tons.

★ ★ ★

Canada: A subsidiary of British Ropes Canadian Factory Ltd., the **Western Canada Ropes Ltd.,** Edmonton, Alberta, is erecting a new plant for the manufacture of wire rope.

Interlocking FENCE LOOMS



- Fastest — Most Efficient
- Preferred by Leading Mills
- Low Maintenance Cost
- Wrapped Stay Fence
- Straight Stay Wires
- Integrated — Space Saving
- Replaceable Main Bearings
- Single or Double Strands
- Years of Low Cost Production

Write for Detailed Information — Without Obligation

Interlocking Fence Co., Box 8, Morton, Ill.

Specialists In Fence Looms

PRIMARY ALUMINUM PRODUCTION
IN THE UNITED STATES
(in pounds)

November	290,162,159
October	298,250,683
Total through November	* 3,061,712,773
1955	
November	267,377,623
Total through November	*' 2,850,075,233
All-time record month	
July 1956	303,248,010
All-time record quarter	
2nd 1956	882,505,193

* Revised from previous reports

Handbook on Grinding

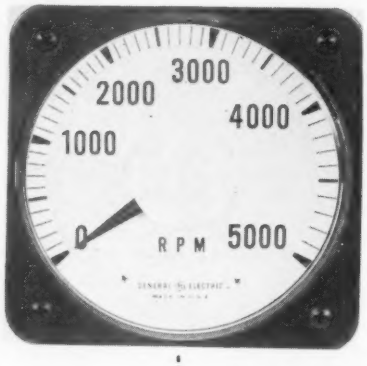
"A Handbook on Tool Room Grinding" is the title of a new 222 page booklet just published by **Norton Company.** This booklet combines under one cover the information previously found in three booklets covering general tool grinding, carbide tools and cast alloy tools. The material in the new handbook has been thoroughly edited to make this one of the most complete and up-to-date reference books for tool room use. To obtain a free copy, ask for Form 781. Write to Norton Company, Worcester 6, Massachusetts.

Speed Variator Drives for Extruders and Wire Insulating Extruder Lines

(*Continued from page* 166)

speed range of more than 10:1 (See Fig. 9).

***Low cost, high speed, moderate accuracy,* suitable for either extruders or capstans. Generally desirable to mount on high speed shaft on the extruder drive to avoid very high pulley ratios. Accuracy will probably not be satisfactory for speed range of more than 10:1 (See Fig. 10).**



DB-18X Meter
(Rectifier Type)

Model IE148
Tachometer Generator
(AC Current)

Fig. 10—High speed moderate accuracy tachometer generator and high accuracy, long scale meter.

***Moderate cost, high accuracy,* suitable for use on either extruders or capstans. Preferable to connect to high speed shaft to avoid using very high pulley ratios. This is the best tachometer to use when very accurate speed indication is desired, or when tachometer must operate over speed range of more than 10:1 (See Fig. 11).**

SPEED INDICATING INSTRUMENTS

***Low cost, medium scale,* may be used with any of the listed tachometers when minimum cost is desired. The instrument will be a rectifier type when used with a-c tachometers (See Fig. 9).**

How to cut your wire handling time 4 TIMES or more...

Use Sheffield Manufacturer's Wire in the new

Sheffield KONE-PAK

Goodbye to the old method of packing small 100 to 2000 separate coils of wire in a carload! Sheffield puts the same amount in just 50 KONE-PAKS. And your unloading costs go down.

You'll save by having fewer units of wire to handle. Faster set-up for threading into machines. Fewer loadings. Less down time for changeovers. Scrap-ends loss reduced around 75%. Big cuts in labor costs. Wire snags reduced to a minimum.

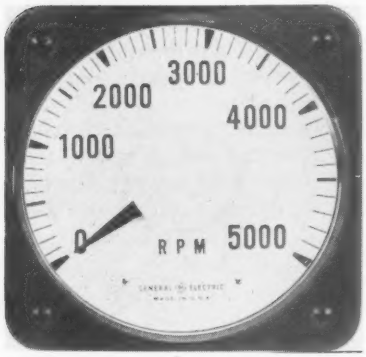
For still more economy: Ask for the help of our metallurgists and wire specialists to be sure you get the exactly-right wire for your needs. Call your nearest Sheffield office.

Now! Rust-Protected

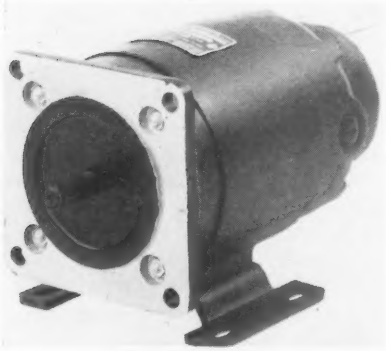
Every shipment of Sheffield Manufacturer's Wire is protected with special paper or pellets that release a rust- and corrosion-resistant vapor.

SHEFFIELD STEEL
DIVISION
ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

Moderate cost, long scale, **this instrument may be used with any of the listed tachometers when slightly higher cost is justified to obtain more convenient reading. These will also be rectifier types when used with a-c tachometers.**



DB-18 Meter
(DC Current)



Cat. No. 9894743
Tachometer Generator
(DC Current)

Fig. 11—High speed, high accuracy tachometer generator and high accuracy, long scale meter.

The Future of Speed Variator Extruder Drives

While it has not been possible to either consider all of the operating requirements of extruders and wire insulating extruder lines, or all of the functions that can be obtained with speed variator drives, it is hoped that the features of this type of equipment and the considerations involved in using Speed Variators for extruders that have been pointed out here will assist the manufacturers and users of extruding equipment to take full advantage of the flexibility and operating convenience available with Speed Variator drives. These drives, combined with the continuing improvements in extruder temperature control and head design, continuous, non-contact diameter measuring equipment, and automatic dual takeup reel stand design, should insure better extruded products, lower costs, and a steadily growing market.

How to Choose an Extruder

The Prodex Corp., Fords, N. J., has issued Technical Bulletin No. E-3 under the above title, in which the subject is treated comprehensively in 46 pages of text, drawings and illustrations.

★ ★ ★

Mechanical details, operating conditions, speeds and other factors of interest to extruder users are covered. Bulletin E-3 may be secured by writing the company for a copy.

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CABLE FILLER

Made to Your Most Exacting Specifications

Plymkraft Cable Fillers are made to fit your particular standard of manufacturing. Whether it is treated with wax, jute saturant or anthracene, Plymkraft is made to meet your moisture requirements in cables. Always uniform, made to a fine tolerance, and ready to use, Plymkraft Cable Fillers are ideal for highspeed cablers where extra strength is a must. Plymkraft's fill capacity means savings in a good-looking cable.

To keep up to date with cable filler developments, it takes only an inquiry for samples of Plymkraft. To find the quality cable filler best suited for your wire needs, write today to:

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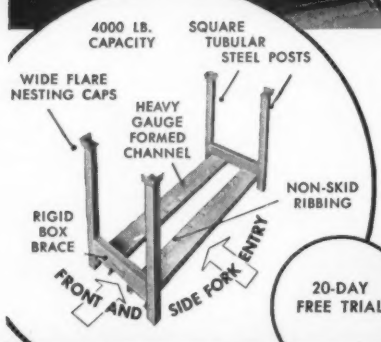
PORTABLE
WIRE
COIL
RACKS



Solve Wire Coil Storage Problems

Makes handling and storing of unwieldy wire coils a simple one-man operation. Improves plant housekeeping, saves space, provides positive inventory control. Front and side fork entry permits closer stacking and greater maneuverability in narrow aisles. Saves time, labor, cuts costs. Standard and special sizes.

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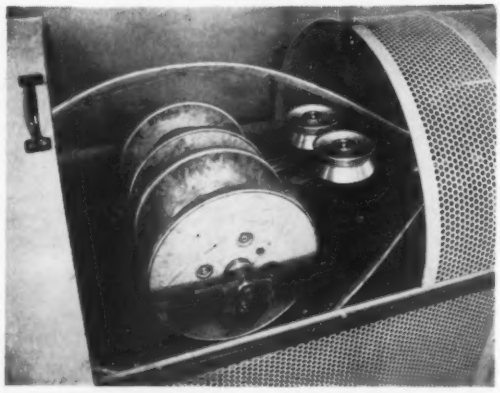
MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE

TWO-WIRE DOUBLE TWIST CONSTANT TENSION TWISTING MACHINE



Designed and built for the uniform twisting of finer wires as small as No. 26 gage.

Tension control is combined with over run prevention and slow acceleration to permit the use of large reels and long lengths of small diameter wires.

Speeds up to 2280 lays per minute.

Reel sizes up to 24 inches diameter and 9¼ inches overall width or 19 inches diameter and 13½ inches overall width.

These machines are very efficient high speed units.

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Tel. STuart 1-2205

New Developments in Silicone Rubber Compounds for Extruded Electrical Insulation

(*Continued from page* 175)

hardening of the silicone rubber insulation. Relative resistance to hardening is being studied by means of ultimate elongation measurements. This property was chosen because we felt that correlation existed between elongation and stress-cracking under flexing conditions. A value of 75 per cent elongation was selected as the end-point for indicating failure.

★ ★ ★

Only one compound—SE-972—has become so hard as to breakdown electrically. This compound has relatively poor heat aging qualities; heat aging is accelerated by these test conditions. 81625 and 81686 have approached the 75 per cent elongation value after 100 hours exposure so that tests have been discontinued.

★ ★ ★

The next step in our program calls for determination of endurance life at 200C. When these points have been established for the various compounds, consideration will be given to obtaining similar data at lower temperatures.

★ ★ ★

These test conditions are so severe that organic rubber insulation would fail in a few minutes even when tested at room temperature. Consequently, the limited data so far available would indicate that the ozone resistance of silicone rubber at temperatures as high as 250C is still very good. It is recognized that moisture, surface contamination, degree of stress, and other variables, which might be encountered in service and which are not factored into our program, could influence the performance of a cable under a specific set of conditions.

★ ★ ★

In our contacts with our good friends in the wire and cable industry, we hear many variations of a single complaint "We cannot keep up with the flood of new compounds being generated by the silicone industry!" No complaint was ever more justified! Frankly, there are times when we ourselves

have difficulty keeping pace with new developments.

★ ★ ★

General Electric is only one of three silicone suppliers. We would hate to venture a guess as to the number of standard and experimental silicone rubber polymers and compounds that are available on the market. Actually, it would be unwise to state a number because it would become out-of-date during the time interval between writing and publishing this paper!

★ ★ ★

One approach to "damming" the flood of new compounds involves the development of better screening techniques in the laboratories of the silicone suppliers. Steps in this direction have been made possible through greater experience with industry requirements and screening techniques combined with the acquisition of more complete laboratory processing and testing equipment. We shall make every effort to do a better job of selectivity in our new products.

★ ★ ★

We in the silicone industry are also looking for the "all-purpose" insulation compound. We do not expect to find it in the near future but intend to get as close to it as possible. All we ask is that you try to bear with us in our progress towards ever better products.

Wire Plated Before Drawing by Novel Spiral Process

(*Continued from page* 169)

desired weight collects. For long-run operations it is collected continuously on a power-driven coiling mechanism synchronized with the speed of the plating unit.

★ ★ ★

The company currently has four of the plating lines in operation at its Niles plant, with total capacity of 34,000 amperes of connected direct current. The patented process has already been licensed by National-Standard to several leading industrial concerns.

Have You Read
"STEEL WIRE IN AMERICA"?
by Kenneth B. Lewis
The price is $15.00

Store Your Bar, Rod and Pipe Stock Faster, Easier Neater, Safer

USE JARKE
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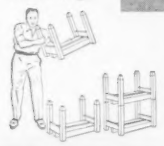

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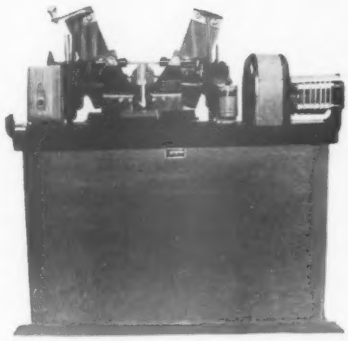
OF YOUR SCRAP AND REJECTED WIRE & CABLE IS GUARANTEED WHEN YOU HAVE THE RIGHT MACHINE ON THE JOB.



Many of our machines have been in service up to 10 years. Our later MODEL "526" (pictured), with a capacity of 5/16" to 6", is now the accepted leader in the scrap and salvage trade. Strips short or long lengths, or off the reel.

For FAST and CLEAN CUTTING, in most cases actually taking the cable apart. No other machine can match the patented cutting action of the "526".

SAVES ALL RUBBER, PLASTIC, LEAD, COPPER AND ALUMINUM

Several models available for small or special work and plastic tubing.

Detailed information available—ask for it

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Just as you have been helped many times by the contributions of others, this gives you an opportunity to reciprocate tangibly by drawing upon your own experience for the benefit of others. It advances the welfare of the industry and helps to make for progress.

Such articles will be paid for upon publication. However, if you prefer to contribute your article and you are a member of The Wire Association, your article will be eligible for the Medal Award or a Certificate of Honorable Mention, awarded each year at the Annual Convention for the most meritorious papers.

May we count on you? Address

EDITOR

WIRE AND WIRE PRODUCTS
453 MAIN STREET STAMFORD, CONN.

How Some New Wire Processing Equipment Came into Being

(*Continued from page* 178)

more companies asked us to produce "those cylindrical spiders". Our company engages in other activities and there are just so many production hours in a day. So we had to go slow. We made more and more spiders for our good friends like Gilbert and Bennett and Atlantic Wire. Gilbert and Bennett, for instance, has a long and distinguished history extending from 1818 to the present, from the manufacture of horse-hair sieves, to the wire products that are today used in dish washers, radio cabinets, farm tractors, shipboard cable and scores of other applications. Atlantic Wire produces high-quality steel wire that goes into pins, papers clips, staples, rivets, screws, etc.

★ ★ ★

As the records of the spider unfolded, the intriguing possibility of a Spider, Jr. presented itself. Since Mr. Spider, Sr., had conducted himself so well, it seemed entirely reasonable that a drastically smaller edition could be designed for certain operations that would permit loading of wire coil right at a draw bench and, subsequently, transportation to the annealing room. The advantages of this proposal were obvious: time required for loading wire coil onto a lift at the draw benches and additional loading and unloading to the big spider in the annealing room would be drastically slashed. More than this, since certain wires must be returned to the draw benches for further processing after annealing, it would be a simple matter to return small, portable spiders right from the annealing furnaces to the draw benches, where they could be unloaded right onto a coil flipper. Once again, we set to work. The smaller spiders that resulted—40″ high on the average—pretty much followed in basic design the principles of their ancestors. Happily, too, they proceeded to demonstrate, in actual service, that their smaller size had not reduced in any manner the durability of the larger editions.

Next—Portable Flippers

But it seemed that other matters required attention. Both the big and little spiders had done a nice job in saving expensive repairs and replacement, in reducing "down-time" and in cutting the man-hours required for certain operations. Still, our engineers were far from satisfied: there was one other important area that seemed to invite scrutiny. It was at the drawing machines; there the wire coils were welded together and placed on standard coil flippers, all of which were anchored solidly to the floor. Their very immobility constituted a problem. Coils of welded wire had to be picked up by a ram, brought to the flippers, and there transferred to the flipper by hand—a back-breaking process for even the most rugged mill operators. In addition, the drags on the flippers was far from ideal, the wire having a tendency to pull off either too fast or too slow.

★ ★ ★

The question occurred to us, why not design a portable flipper? If this could be done, and welded coils of wire could be picked up right on the flipper itself, the entire hand operation of transferring the coil from the ram to the flipper could be completely eliminated. The potential benefits in speed and man-hours were attractive.

★ ★ ★

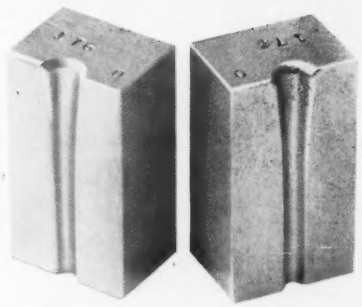
As it turned out, the answer lay in a "carrier plate" that could easily be attached to or removed from a lift truck. It is made to fit the back of a portable flipper. The lift operator simply drives to the back of an emptied flipper, lifts the flipper through use of the carrier plate, runs the flipper over to the coils of welded wire, loads the coils right to the flipper ram and returns the flipper to its original position. No manual work of any kind is required for the entire operation.

★ ★ ★

The portable flippers were designed with both a top and bottom drag, if desired. Since the bottom drag channel was made adjustable, it could instantly be made larger

Sjogren POINTING DIES

SJOGREN Pointing Dies have proven themselves! Made from shock-resisting high grade steel they assure many hours of hard, continuous usage. Fit your swaging machines with these rugged, S & S Pointing Dies, made to order on your specifications, they guarantee you service.



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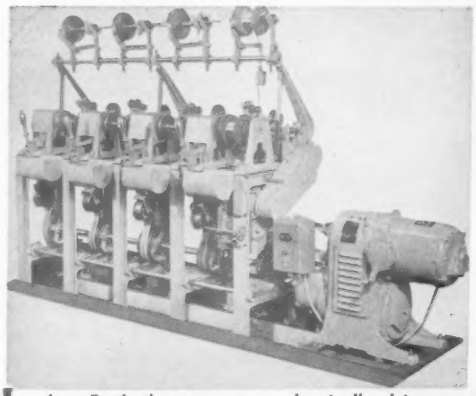


1900-HV MULTIPLE SPINDLE SPOOLER

SPECIFICATIONS
Size Range: .010" to .080" or heavier if soft and many flat wire sizes.
Max. Spool Size: 16" flange diameter.
Capacity: usually 4 to 8 spindles.

The 1900-HV Spooler is a rigid, precision machine which will consistently produce a uniform, dense wire lay. Both the traverse and spindle drives are regulated through wide-range, stepless, variable speed units, eliminating change gears. The 1900-HV is completely adaptable to your particular constant or changing demands. All controls are positive. Adjustments are made accurately with the spooler in operation and without tools.

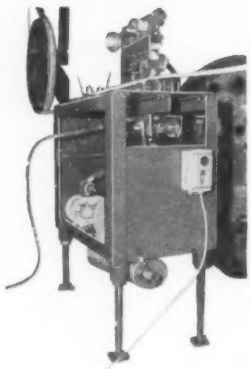
Both smooth acceleration and rapid stopping is obtained through a single lever at each station. Spool changing is simple and rapid. Anti-friction bearings are used on all shafting and spindles.

Your special requirements can be incorporated into the design. Each machine is delivered ready for operation from your power supply. Payoff stands furnished as extras.

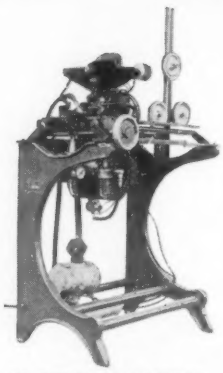
Consult us on your spooling problems.

ROBERT J. EMORY COMPANY
31 East Runyon Street Newark 5, N. J.

LABELING MACHINES for WIRE and CABLE



SE-300 SERVICE ENTRANCE LABELING MACHINE.
Designed for labeling Service Entrance Cable. Will apply a UL label every 20 feet. Fully automatic. Speed limited only by the speed of the wire.



FA-200 FLAG LABELER.
This machine has high operating efficiency—up to 3000 labels per hour. Used before an Artos Cutter, with speed governed by cutter. Completely automatic. Space available on labels for advertising.

Write today for detailed information.

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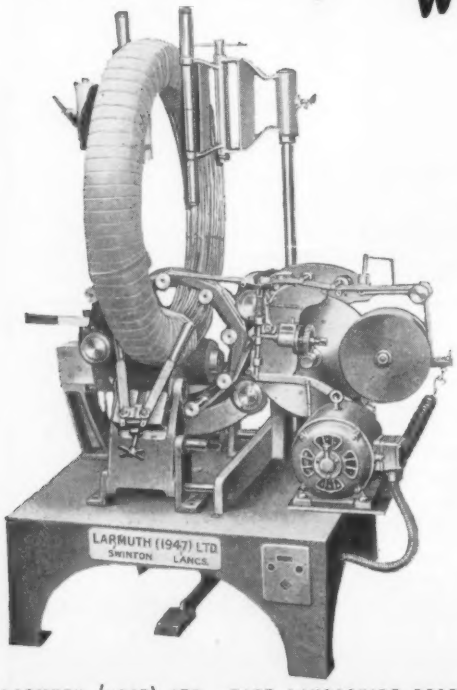

are built to finest British engineering standards and are in use throughout the world for spiral wrapping of Motor Tyres, coils of Wire, Strip, etc., from 3" bore upwards. Also straight length Tubes, Bars, Rods, etc.

"BOUND" to get there safely.

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or smaller to handle wire rod of varying sizes.

★ ★ ★

Throughout all steps leading to the finalized design of the portable flipper, the engineers at both Gilbert and Bennett and Atlantic Wire were most helpful in giving us the benefit of their years of experience. This counsel was in large measure responsible for the marked success of the portable flippers from the moment of their introduction. Reports from various parts of the country have stressed the way in which these flippers have brought new speed to drawing operations.

★ ★ ★

None of these reports, however, will ever give us more satisfaction than the comment of a wire mill employee we encountered not long ago. He kept glancing up from his work to study a fork lift operator placing a portable flipper in position; finishing quickly, the operator settled back and lit a cigarette. A second later, the employee at our elbow gave us a nudge. "See that guy"? he volunteered hoarsely. "He used to have one of the toughest jobs in the plant. Now he's got the easiest!"

Preventive Maintenance of Modern Plant Instruments

(*Continued from page* 182)

however, that faulty operation of the plant equipment was the first cause of unbalance of the process, and this has reflected itself in the behavior of the instruments used.

★ ★ ★

Overstrain of instruments can easily be caused by faulty operation and must not be blamed on the design of the mechanism. If an instrument becomes faulty it should not be allowed to remain in this condition. Preventive maintenance will detect inefficiencies by performance of regular accuracy tests based on a time schedule, to be followed by an overhaul by the man trained for this purpose.

★ ★ ★

A daily careful inspection of recorder charts by the works engineer might reveal details of pro-

cessing, which have escaped the attention of the plant operator, but might also disclose a faulty instrument. If careful inspection of the instrument discloses a strained condition of certain parts of the mechanism, often caused by overload, a well-trained staff will handle the case properly. Minor defects will be detected, and may be put right on the spot. Other causes of breakdown might mean a complete overhaul and re-calibration of the instrument at the makers' works.

★ ★ ★

The introduction of new machines and apparatus, equipped with elaborate measuring and/or controlling instruments for their economical operation, should be an inducement for top executives to modernise existing plant. This can be achieved by improving working conditions, layout, alteration of design details, fitting of better auxiliary equipment, etc., by exchanging out-of-date gauges for modern measuring or controlling indicators or recorders. The use of automatic control instruments is rapidly growing with the modernisation of plant equipment, and is beneficial to uniformity of goods and for manufacturing efficiency in general.

Cut Costs by Simplifying Nut and Bolt Inventories

Almost every manufacturer can cut inventory and stock handling costs by using fewer sizes and types of nuts and bolts. And simplification need not affect quality, according to fastener experts of **Russell, Burdsall & Ward Bolt and Nut Company.** A large electrical manufacturer found it no handicap to eliminate all bolt sizes in sixteenths in bolts larger than 3/8 inch. An engineering firm eliminated 1700 different items from inventory by setting up standards for joint designs.

★ ★ ★

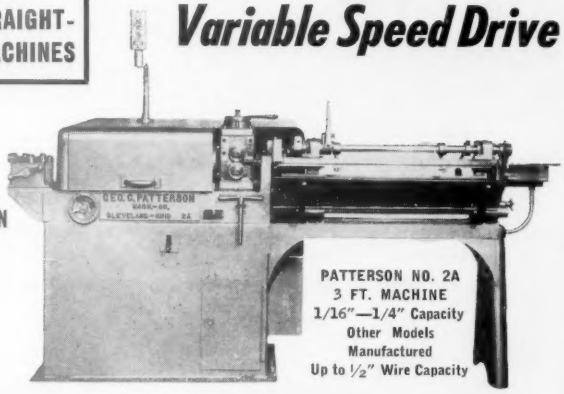
Here are some of the methods recommended by R B & W for cutting fastener costs in purchasing, inventory and assembly:

1. There is seldom need to stock special alloy bolts and cap screws. Three types of steel fasteners—machine bolts,

GEO. C. PATTERSON
HI-SPEED
AUTOMATIC WIRE STRAIGHTENING & CUT-OFF MACHINES

Electrically Operated with Variable Speed Drive

- MINIMUM COST
- MAXIMUM PRODUCTION
- ACCURATE LENGTHS
- NEW FEATURES



PATTERSON NO. 2A
3 FT. MACHINE
1/16"—1/4" Capacity
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Up to ½" Wire Capacity

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A RUGGED, DEPENDABLE
Wire Measuring Machine
for fast, accurate runs!

Wire is easily "loaded" into measuring machine from the side or the rear without having to feed through guide bushings. Brake stops measuring wheel instantly when wire leaves measuring rolls. Predetermined units will automatically stop wire at desired length. Very accurate speeds to 2500 ft. per minute.

MODEL "L-25"
Capacity .030 to 1 in. Tachometer to govern rate of speed is optional.

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Will give you maximum • • •

Value • Service • Economy

For this you pay a little more in first cost, but you save in faster work, in superior die finish and in better wire drawn. DANFORTH POWDERS are uniform in purity, quality, grain shape and accuracy of grading.

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The DANFORTH PROCESS of reclaiming produces powders that are *guaranteed* to be 99% or better pure.

Write today for information on diamond powders.

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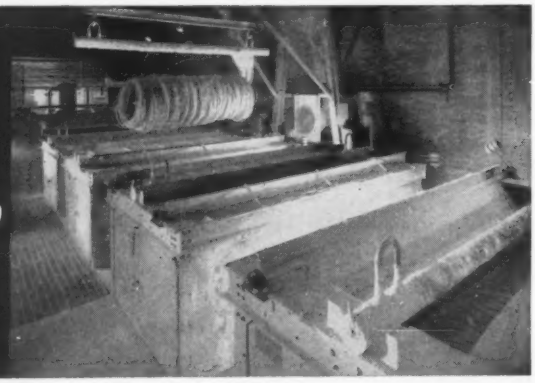

Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
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OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

bright cap screws, and high strength bolts, identified by three radial dashes on the bolt head—can do almost all joining jobs. A manufacturer who uses anything else should double check his reasons.

2. Forget thread fits for all but specialized needs—such as studs for tapped holes. The standard tolerance fit will provide as strong a joint at lower cost.

3. Use only coarse thread fasteners except for positioning screws where fine adjustment is an absolute necessity.

4. You can often save money by changing diameter or length rather than adding another item to stock.

5. Stick with hex head bolts. They do a better job than the square.

6. Heavy nuts belong with larger bolts, finished nuts with smaller. You can save by stocking only heavy nuts for large bolts, finished nuts for the smaller sizes.

New Motor Catalog

A new twelve-page Reliance Motor Selector, published by **Reliance Electric & Engineering Co.,** 1088 Ivanhoe Rd., Cleveland 10, gives full information on how to select a-c. motors for specific applications. Included in the new booklet, Bulletin B-2103-1, are such comprehensive selection data as speed-frequency relationship, NEMA design classes, torque characteristics, NEMA current and torque values, frame selection tables, and dimension charts and mechanical modifications for all frame sizes from 182 to 6085. Two pages are devoted to a pictorial glossary of motor enclosure terminology. A highly valuable bulletin for motor users, it is offered free for the asking.

Calculator for Determining Weight of Wire and Strip

A handy calculator offered by **National-Standard Company** makes it easy to determine the weight of springs made from given sizes of round wire or flat stock.

★ ★ ★

The calculator is of the circular slide rule type, with one side for round wire and the other for strip.

★ ★ ★

To calculate the weight of pieces fabricated from round wire, the rotating disc is set on the diameter scale, which ranges from 0.005 to 0.250 inch, and the weight, in pounds per thousand pieces, is read opposite the lengths of the wire.

Length is given on a scale ranging from ½ to 50 inches. A similar calculation may be made for strip.

★ ★ ★

Scales are designed for steel, and conversion factors are given for aluminum, brass, copper, Monel, titantium, phosphor bronze, and stainless steel.

★ ★ ★

The calculator may be obtained from National-Standard Company, Niles, Michigan; Worcester Wire Works Division, Worcester, Mass.; or Athenia Steel Division, Clifton, N. J.

Norton Increases Allowance on Reclaimed Diamond Material

Norton Company has announced an increase of approximately 10% in the allowance it will pay for diamonds reclaimed from grinding swarf and diamond wheel stubs returned for salvage by customers. Under the present table of allowances, the company will pay up to $2.00 per carat for diamond reclaimed.

★ ★ ★

Many users of diamond grinding wheels have found reclaiming swarf and wheel stubs a practical means of substantially reducing their grinding costs. Information on reclaiming of diamonds is available from Norton Company, Worcester 6, Massachusetts.

Giant Wire Rope Proofer Installed by ACCO

Until a year or so ago, there had been no major improvements in the design characteristics of wire rope for half a century. Tensile strengths of the most rugged specimens could not exceed 270,000 pounds per square inch. Today, this figure has been increased and previous top standards exceeded by at least 15 per cent.

★ ★ ★

After several years of research and experimentation, the **American Chain & Cable Co.** stepped up the tensile strength of wire rope with the introduction of their VHS (Very High Strength) wire rope.

In addition, with the introduction of the company's Dualoc, the first mechanical wire rope splice, it became necessary to develop new testing facilities. Up to recently both wire rope and wire rope slings were tested in a 250,000 pound proofloader, which became inadequate for full testing procedures as rope strengths improved and sling diameters rose.

★ ★ ★

The situation has been remedied with the recent installation at ACCO's Wilkes-Barre, Pa. plant of a new universal hydraulic tester of horizontal design. The unit is one of the largest machines of its type to be used in private industry. Its capacity is 600,000 pounds—over twice that of the older tester.

★ ★ ★

It is unique in that it incorporates a long test bed in which specimens over 60 feet in length can both be prooftested and breaktested. Other units of this capacity in testing laboratories are usually set up to handle half this length or less.

★ ★ ★

According to **Emerson H. Todd,** sales manager of the Wire Rope Divisions, "This massive piece of laboratory equipment in our production line has guaranteed that even the largest of our slings can be subject to a prooftest of twice its safe working load before it leaves the factory."

New Industrial Furnace Bulletin

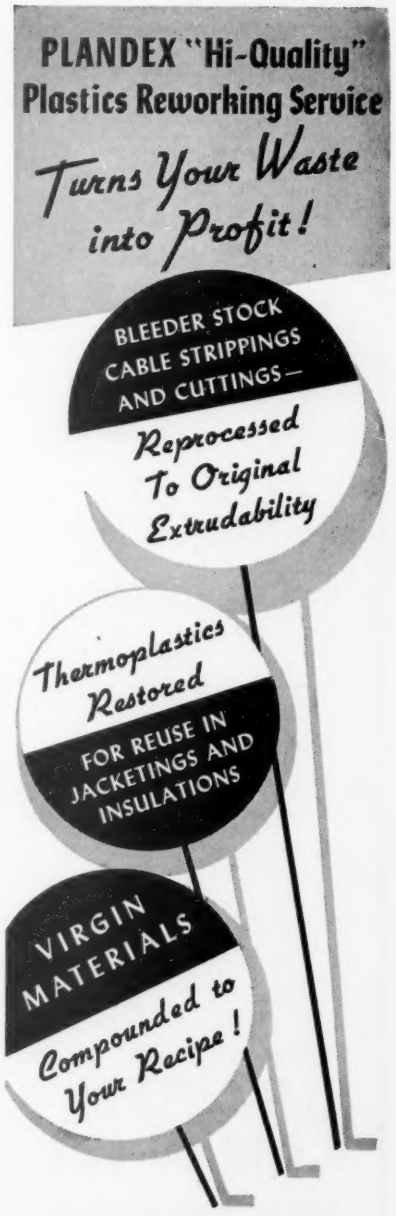
A new 8-page two color gate-fold catalog shows and describes 27 Standard Rated Surface Heat Treat Furnaces.

★ ★ ★

This new bulletin illustrates the large variety of Surface standard equipment for all types of industrial heating applications, from small laboratory furnaces to large continuous brazing furnaces, in a comprehensive and easily digestible form.

★ ★ ★

Request Bulletin SC-175 from **Surface Combustion Corp.,** Toledo 1, Ohio.



Turn your waste into valuable by-products the Plandex controlled quality way. Every job benefits from thorough experience, modern customized equipment including dual worm compounder-extruders and careful accurate interpretation of your specific requirements. We serve the industry's leaders throughout the U.S. and Canada.

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"IT CORRECTS THE DIE"

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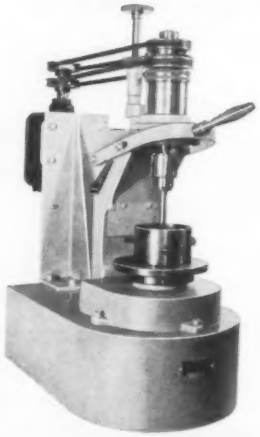

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New High Speeds in Drawing Attained

At the **Steel Company of Canada's** Parkdale Works at Hamilton, Ontario, high finish speeds—in excess of 4000 fpm—have been attained on new continuous rod drawing machines. Placed in operation early in 1956, these machines incorporate the most recent advancements in machine design and regulated, electronically controlled drive equipment. This installation, in addition to one in the Pittsburgh area, marks the very latest in wire drawing equipment found anywhere in the world.

★ ★ ★

From the early 1920's to date, the ferrous wire industry has seen the speeds of continuous rod drawing machines advance from 350 fpm to the present day speeds which are in excess of 4000 fpm. It has been an evolution marked by a continuous process of alternately improving the machine design, the electrical drive system, and operating practices. Each of these three areas was worked on in turn until a point was reached, beyond which the speed could not be increased through further effort in that particular area. As a limit was reached in one area, effort was then switched to one of the other areas until its limit was reached and so on, in a constant rotation from area to area—reaching new plateaus of speed each time.

★ ★ ★

The stages of development of continuous wire and rod drawing machines from the earliest to most recent types are traced. Details of mechanical design and the electronically controlled drive system are also discussed in detail, with particular emphasis on the actual installation at Steel Company of Canada.

★ ★ ★

The foregoing was abstracted from "Greater Flexibility in Wire Drawing," a paper by R. C. Cuttle, Reliance Electric & Engineering Co., and M. A. Nye, Vaughn Machinery Co., given at the AISE Convention in Cleveland in September, 1956.

Six *advantages from just* One *dip!*

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Here are the advantages you get when your stock is Borax-coated...

1. GOOD ACID NEUTRALIZING
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One dip puts on a Borax coat that is tight, yet pliable, and dries in a few minutes. It provides a good vehicle for your drawing lubricant and won't flake off. Borax-coated rods are a lot cleaner to handle in transit and are protected from rust while in storage. Try BORAX or BORAX 5 MOL on *your* stock!

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20 MULE TEAM®

New Insulation Tester Audibly Indicates and Totalizes Faults

The new P-1 tester counts insulation faults (pinholes) in insulated wire at speeds up to 600 feet per minute—for continuous production use. For use as an insulation continuity tester, the model P-1 Insulation Tester features:

- **— Continuous display of total number of pinholes.**
- **— Continuously adjustable voltage control and panel meter to set voltage for single or multiple coated wire (0-250 V dc).**
- **— Small moistened sponge, electrode (uses tap water, not mercury).**
- **— High sensitivity detector operates magnetic counter and buzzer.**
- **— Small test current, 10 microamps, enables use of high resistance electrode circuit, assures reliable operation, no shock hazard, will not harm or mark the finest wire and will detect through 10 megohms.**
- **— Continuously adjustable sensitivity control to desensitize detector to any desired value.**

★ ★ ★

The unit is available in other voltage ranges for use with other electrodes. It is excellent for sensitive electrical continuity testing; with adjustable pass/reject value of resistance; for capacitor testing; etc.

★ ★ ★

For further information, contact the manufacturer, **Peschel Electronics Inc.,** 9 Garden Street, New Rochelle, N. Y.

New Major Nickel-Producing Operation to be Developed

Plans for the development over the next three to four years of a $175,000,000 nickel project in the Mystery-Moak Lakes area in Northern Manitoba were announced by Premier **Douglas Campbell** of Manitoba and **Henry S. Wingate,** President of **The International Nickel Company of Canada, Limited.**

★ ★ ★

International Nickel will open two nickel mines in the area, to be known as the Thompson and the Moak Mines. The project will constitute the biggest nickel-producing operation in the world next to Inco's operations in the Sudbury District of Ontario and will be the largest single investment of any kind in Manitoba. By arrangement with the Manitoba Government, the new town and the plant site, as well as the immediately adjacent mine, are to be named Thompson in honor of **Dr. John F. Thompson,** Chairman of the Board of Inco, who this year completed 50 years of service with the company. The town will accommodate a population of 8000.

★ ★ ★

The project in Manitoba together with the progress under way at Sudbury will lift Inco's regular 1955 annual nickel-producing capacity by approximately 130,000,000 pounds to 385,000,000 pounds, or by 50 per cent, of which some 24,000,000 pounds will be regular production to replace existing temporary premium-priced production for the United States national stockpile.

★ ★ ★

"Apart from its importance as a new producing area which will substantially increase the free world's supply of nickel for industry and defense, we are enthusiastic about the part Inco will be playing in opening up what may well prove to be one of the greatest remaining frontiers in North America,". Mr. Wingate stated. "Today some 150,000 square miles in Northern Manitoba surrounding the site of Inco's operations are almost totally devoid of industrial production. This entire area will feel the influence of Inco's great industrial project and the future changes will be far-reaching in their effect."

New Portable, Semi-Automatic Tying Machine

Featuring an automatic twist-tie, the new Inland Speed-Flo Model 1200 Portable, Semi-Automatic Tying Machine, is engineered to new heavy duty production standards.

★ ★ ★

Operation is said to be simple, requiring only a few minutes of instruction. Strength and wearability has been engineered into parts

Increase- HIS METAL CUTTING POTENTIAL
Decrease- YOUR METAL CUTTING COSTS
WITH THE NEW PORTER WORK-STATION CUTTER

No matter what kind of metal you cut — wire, rods, wire rope, cable or any other kind, you can save valuable man hours in your metal cutting operations with the rugged new Porter Work-Station Cutter. Can be fastened to work station welding unit or bolted to a plank and used as a portable cutter. Available in a variety of types of cutter heads for specific requirements. Notched Shear heads for cutting wire rope or cable — Center Cut heads for cutting copper, brass, aluminum, soft steel rods or wire — Center Cut round edge for hard spring wire, etc.
Available in two sizes:
1B cuts wire and cable up to 3/8" diameter.
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Send us sample of metal to be cut and we will advise proper type of jaws required. HKP®

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Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3437"
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Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
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FINE WIRE MACHINES • SPOOLERS • POINTERS
PATENTING, TEMPERING, GALVANIZING AND
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If you have a wire electric conductor that fails because of too short life.

We may be able to design an electric conductor from TINSEL that will give many times the life obtained by the use of stranded wire.

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subject to hard wear with resulting minimum maintenance. The automatic twist-tie unit is easily accessible for quick adjustment. Tying head can be conveyor mounted to satisfy the individual production program. Operating specifications state capability of as much as 20 ties per minute—and bundle sizes unlimited within a 19 through 16 gauge range.

★ ★ ★

The Speed-Flo Model 1200 will be available on outright sale or rental basis. Inland Tying Wire for use with the Model 1200 is furnished in galvanized or coppered finish, based on package weight and size. It is also offered in the new Inland 500 pound Pay Off Pak for frictionless, tanglefree feeding. Full information may be had by writing Inland Wire Products Co., 3947 South Lowe Ave., Chicago 9, Ill.

ACP Acquires Protective Coating Concern

Acquisition of all outstanding capital stock of the **Benjamin Foster Co.**, Philadelphia, Pa., by the **American Chemical Paint Co.**, Ambler, Pa., was announced on September 19th in a joint statement by **Leon Cherksey**, chairman of the board of ACP, and **Benjamin Foster**, president of the Foster firm.

★ ★ ★

The Foster Company and its subsidiary, Benjamin Foster Co. of Canada, will operate as wholly owned subsidiaries of ACP. No personnel changes are planned.

★ ★ ★

ACP produces metal working chemicals under trade names Alodine, Granodine, Granodraw, Rodine, Duridine and Lithoform, and Foster specializes in industrial coatings and adhesives for protection of thermal insulation and protective coatings for metal and concrete surfaces.

Electron Microscope Catalog Available

A new 12-page brochure titled "Norelco Electron Microscopes",

QUALITY

You'll find proof of this in every "CAREW" Cutting Nipper. Since 1863 every "CAREW" has been the product of superior materials and painstaking workmanship. Intrinsic QUALITY underlies the overall efficiency, operating ease, and production economies you get with every "CAREW" Cutter.

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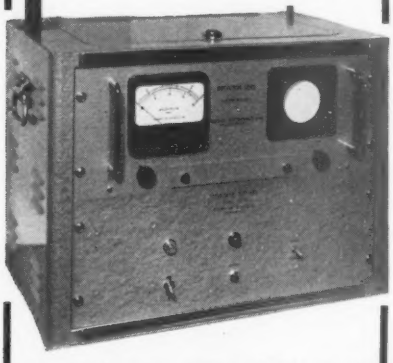
CORONA TEST SETS



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giving complete data on the construction and operation of such instruments, is available gratis from the **Instruments Division, North American Philips Company, Inc.,** 750 South Fulton Avenue, Mount Vernon, N. Y.

★ ★ ★

In color, the new booklet is well illustrated and covers such things as the electron optical system, pumping unit, electronics, high voltage, column, gun, magnetic beam alignment, condenser and aperture, beam wobbler, objective lens and astigmator.

★ ★ ★

The new literature also discusses wide field scanner, diffraction lens, intermediate lens, projector lens, reflection-diffraction sample manipulator, 35 mm camera, front-end plate camera, 2″ x 2″ plate camera, insert screen with binocular viewer, image brightness comparator, and operating controls.

New Wire Machinery Company Formed

The recent formation in Rhode Island of **Hope Industries, Inc.** has been announced by the four associated firms who comprise the new company. The group includes the original **James L. Entwistle Company,** the **C. O. Hoffacker Company,** the **Edward Parkinson Mfg. Co., Inc.,** and the **De Hoff Corp.**

★ ★ ★

Hope Industries, Inc., with the facilities of two modern production plants, one on Pontiac Avenue in Cranston, and the other in Esmond, Rhode Island, will manufacture a wide range of wire manufacturing and testing machinery.

★ ★ ★

"With each of these firms contributing their individual, specialized skills and production facilities, Hope Industres, Inc. will be able to produce wire machinery well advanced over equipment currently available", a spokesman said.

★ ★ ★

The James L. Entwistle Co., under the direction of **James L. Entwistle,** originator of many of

THE NELSON COMPANY
STANDARD OIL BLDG.. BALTIMORE 2, MD.

WOOD · PLYWOOD · MASONITE

REELS!

10″ TO 120″ IN DIAMETER

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QUICK DELIVERIES

SPECIALIZING IN WIRE ROPE REELS AND INEXPENSIVE "ONE-TRIP" REELS

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Thirty years of experience in quality woodworking.

For WIRE DRAWING

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Strict laboratory control assures uniform quality

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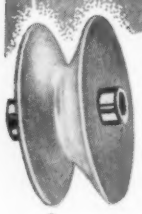

the NEW material that withstands hi-speed pressure of wire by the tons

HEANIUM®
IS THE BEST GUIDE
. . . TO LOW COSTS.

If guide wear is a problem in your mill . . .
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HEANY INDUSTRIAL CERAMIC CORP.
NEW HAVEN 3, CONNECTICUT

the advances in the wire machinery industry for nearly forty years, is exclusive sales representative for Hope Industries, Inc., and has established new offices at Esmond, Rhode Island.

★ ★ ★

To Manufacture Polyethylenes

National Petro-Chemicals Corp. will be in commercial production of medium-density polyethylenes before the end of 1956, it was announced by **Dr. Robert E. Hulse,** Vice President in charge of chemical activities for the parent company, **National Distillers Products Corporation***. A high pressure production technique will be used in Petro's existing polyethylene plant at Tuscola, Illinois to produce these medium-density polyethylenes. The newer materials will be sold under the established trade mark, "Petrothene," through the sales organization of **U. S. Industrial Chemical Co.,** Division of National Distillers.

★ ★ ★

At the same time, Dr. Hulse announced that total polyethylene production capacity of the Tuscola Plant will be increased to 100 million pounds-per-year by mid-1957. The plant, which came on-stream in February, 1955 had a design capacity of 26 million pounds-per-year, but it is currently operating at twice that capacity. Expansion of the polyethylene plant, with attendant expansion of the ethylene, extraction, fractionation, and power plants at the integrated Tuscola petrochemical complex is already under way.

★ ★ ★

While the new technique can produce resins with a density range of 0.92 through 0.95, the company plans at first to add only resins in the medium density range to its existing line of polyethylenes.

* National Petro-Chemicals Corporation is majority-owned and operated by National Distillers Products Corporation, minority-owned by Panhandle Eastern Pipeline Corporation.

Breather Springs Developed by Techalloy

The problem of damaged insulation when hot tanks, towers, pipes and vessels expand and contract has been solved with the introduction of Breather Springs by **Techalloy Company, Inc.** Breather Springs are bands that will follow tank line while gently holding insulation materials in place.

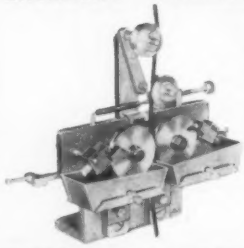
★ ★ ★

Secret of Breather Springs is their ability to expand and contract. In original length they are 4″ long. Fully-expanded, they measure 16″. This 12″ spread is why they do not damage insulation during expansion or contraction.

★ ★ ★

Made from Techalloy .105″ diameter 302 type stainless steel, Breather Springs have a tensile strength of 275,000 psi, high resistance to chemicals and acids and excellent spring advantages up to 600°F. They are only ⅜″ thick, do not protrude through covering materials, such as: magnesia, asbestos, foamglas, calcium silicate, mineral wool, cork and sheet metals.

MARKING WHEELS and MACHINES for ELECTRIC WIRE



Gillies Engraved Concave Wheels are widely used for printing on rubber or plastic coated wire, for code or manufacturer identification. Machines print on ONE or BOTH SIDES in large legible letters. Wheels adaptable to any machine or we will supply machines. Wheels, shafts, ink pans and all accessories readily removable for quick and easy cleaning. Wheels made of hardened tool steel.

Send for samples of wire and prices on wheels and equipment

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Get High EXTRUSION PRODUCTION
with CARBIDE NOZZLES
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Some types and sizes of Nozzles.

One major Electric Wire and Cable concern has produced over 40 MILLION FEET of electric wire with one of our NOZZLES.

Our nozzles will save you money!

You, too, can enjoy these savings. Write or call
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BRIDGEPORT JIG BORING COMPANY
303 STRATFORD AVE., BRIDGEPORT, CONN. TEL.: FOREST 7-8473

Techalloy Breather Springs can cut insulation maintenance costs in two ways. Original application is safer because when Breather Springs start to stretch, the applicator knows the bands are tight enough. Insulation is not damaged in application and this is an important protection, since they do not dig into insulation material.

★ ★ ★

For versatility, Breather Springs can be used with any type bands in widths of ⅜", ½" or ¾" in thicknesses of .015" or .20".

★ ★ ★

Additional information is available from Techalloy Company, Inc., Rahns, Pa.

New Connectors for Wire

Terminals and connectors may be crimped to wire extremities with more speed, greater ease and quality than ever before with new solderless wiring devices developed by the **Electric Terminals Corp.**, 2021 Center St., Cleveland 13, Ohio, according to **E. M. Muldoon**, President.

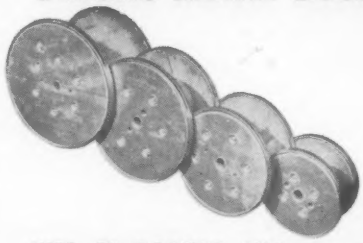
★ ★ ★

These wiring devices are of one piece construction. High conductivity is maintained because they are made of pure soft copper, electro-tinned for maximum resistance to corrosion. Wire slips easily and quickly into the barrel of each device since the receiving end is smoothly tapered to take even the frayed ends of wires. "Bull Dog" grip holding power and perfect long life contacts are accomplished by means of a series of interior barrel grooves and V-notches that firmly hold the wire in place. This provides permanent, vibration-proof, moisture-tight connections.

★ ★ ★

All terminals and connectors are rated beyond the current carrying capacity of the wire used, exceeding the U.L., C.S.A. and U.S. Government specifications and standards. They are available in ring, spade, hook tongue; snap-plugs and flag-type, parallel, butt,

STRONG METAL BOUND RETURNABLE REELS



FAST DEPENDABLE SERVICE ON QUALITY REELS, 12" TO 30" DIAM.

Built to take a beating! Built to protect Coated or Insulated Wire from damage! Kiln dried stock — No nails — Bolted, Waterproof, Glued construction. Especially designed to prevent breaking or splintering.

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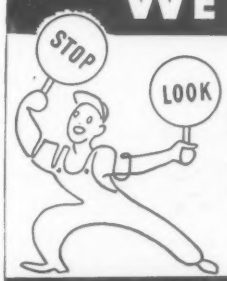

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Fine products are made from fine-quality materials. That's why so many fabricators and formers select Cortland Brand specialized low carbon wires. Cortland Brand wires are among the finest available . . . made from the best corrosion-resisting, open-hearth steel in Wickwire's own mills. Use them for your products . . . in any of the following types, sizes and finishes.

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SIZE: coils, spools or straightened cut to length.
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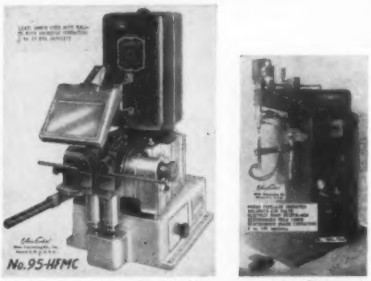
EISLER SPOT AND BUTT WELDERS FOR
THE WIRE INDUSTRY
A WELDER FOR EVERY PURPOSE



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THAT CAN TAKE IT!
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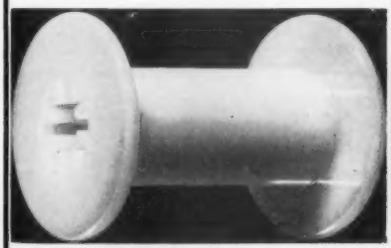
are precision molded of DuPont's Zytel Nylon for more uniform and accurate put-up.



PLAMENCO SPOOLS won't:
- Break when dropped.
- Distort under load.

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Get the facts
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PLASTIC MOLD & ENGINEERING CO.
157 Clifford St. • Providence, R. I.

3-way "Y", 4-way "X" connectors to fit wire ranges of 22-16, 16-14 and 12-10. Special styles and types may be obtained in accordance with customer specifications.

Penn-Texas Buying Lowell Wire

Penn-Texas Corp. has completed negotiations for the acquisition of the assets of the **Lowell Insulated Wire Co.** of Lowell, Mass., **Leopold D. Silberstein,** Penn-Texas chairman, announced.

★ ★ ★

The Lowell firm is a division of the Overlakes Corporation, producers of insulated wire for independent telephone companies, cable for the Signal Corps and power supply cords for appliance manufacturers.

★ ★ ★

Acquisition of Lowell Wire will be through an exchange of stock.

★ ★ ★

Mr. Silberstein said the purpose of the acquisition is to extend the present line of the **Crescent Company** of Pawtucket, R. I., a Penn-Texas subsidiary, which produces insulated wire and cable for the automobile, electronic, radio, electrical and welding industries. The Lowell firm will be under the supervision of Crescent's president, **John M. Sapinsley.** Combined sales of both companies will be about $10,000,000 a year.

Solderless Wiring Terminals and Connectors

A new 8-page technical bulletin entitled "Solderless Wiring Devices" illustrates, describes and furnishes sizes and specification data on new time-saving solderless terminals and connectors for crimping to wire extremities. Write for your copy to Electric Terminals Corp., 2021 Center St., Cleveland 13, Ohio.

Buys Rights for Irradiating Plastics

W. R. Grace & Company has acquired exclusive world rights to what is stated to be a revolutionary process for using radiation to modify and improve polyethylene and other plastics.

★ ★ ★

The licensing arrangement, president **J. Peter Grace** states, has been acquired from **Sequoia Process Corporation** of Redwood City, Cal.

★ ★ ★

Sequoia now is in full production of the irradiated insulated wire. After treatment the wire can be dipped in molten solder at a temperature of 600°F. without being affected. Unirradiated polyethylene melts within 30 seconds under such treatment.

★ ★ ★

He further stated that this process uses the radioactive element cobalt 60 as a source of gamma rays which gives polyethylene remarkable resistance to heat, reduces cold flow cracking and increases strength, without impairing the material's electrical insulation properties.

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To Produce Cal-Tie Wire at Pueblo

The Colorado Fuel and Iron Corp. has installed production facilities for the manufacture of Cal-Tie Wire at its Pueblo, Col., plant, it has been announced by **F. S. Jones,** vice president in charge of sales.

★ ★ ★

Cal-Tie Wire, a special steel wire product for tying reinforcing bars and for other construction tying jobs, was originally developed at CF&I's Pacific Coast Division, and since June 1955 has also been manufactured at the company's Wickwire Spencer Division plant in Buffalo, N. Y. The compact coils of steel wire fit in handy reel dispensers that fasten to the belt. The reels leave workers' hands free for tying, carrying or holding without interference from the tie wire coils. They come in both right and left handed models.

★ ★ ★

Cal-Tie wire, both annealed and galvanized, is available in gauges 14 through 20. Each coil weighs approximately 3 pounds.

English Channel Power Cable

It is reported that the British Electricity Authority and Electricite of France plan to make a connection between the electrical distribution systems of Great Britain and France. They have determined upon a system of interchange of D.C. electrical energy using a single cable. If no difficulties arise it is hoped that work on this project can be started early in 1957. The installation of the cable, the cost of which is estimated at four million pounds, should be completed in 1960.

★ ★ ★

Similar plans were under consideration during the Second World War. The problems of that period, however, made impossible the starting of work on the project. In 1951 the matter was revived and investigation of different types of cable and fittings was undertaken. Short lengths of experimental ocean cable were laid and simulated repairs made on them. Fundamental elements of the problem were subsequently mastered. It has been decided to use gas filled conducting cable, having an impregnated paper insulation.

Air Conditioned Tramrail Carrier

A new carrier for operation on overhead tramrail systems has been completed by the **Cleveland Tramrail Division of The Cleveland Crane & Engineering Co.,** Wickliffe, Ohio. Although it was designed especially for conveying ladles of hot metal used for die casting, the platform can be changed in size and adapted for other materials handling purposes.

★ ★ ★

The carrier has a cab which is enclosed with aluminum paneling and is provided with air-conditioning to keep the operator comfortably cool while transporting molten metal. The door has a safety switch that prevents the carrier from being moved when the door is open.

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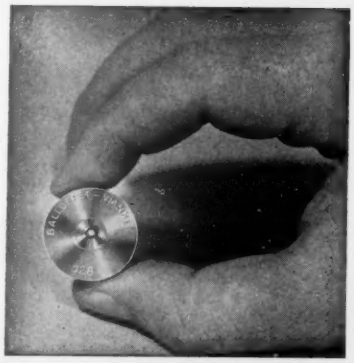

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New Connectors Developed by Alcoa

A new series of electrical connectors developed by **Aluminum Company of America** makes possible a major reduction of conductor clamp inventories. Heavy-duty U-bolt clamps, employing universal, parallel spacer grooves, now can be used on a wide range of cable sizes.

★ ★ ★

The six Alcoa clamps, designated 580 Series, can be used on ACSR from #2 to 715.5 MCM, and will also handle sizes #2 to 800 MCM stranded aluminum conductor. All proportions—length of clamps, number of bolts, bolt sizes—are engineered for the range of conductor size to be accommodated and the job to be done. The U-bolt portion, flattened to reduce bulk, provides wrap-around strength and even pressure distribution.

★ ★ ★

Proven in Alcoa laboratories, the clamps have undergone a thousand heat cycles using various conductor combinations. Test currents produced conductor temperatures of 200 degrees Fahrenheit, with no significant change in connection resistance.

Shaped Nickel Alloy Wires

Low cost shaped and flat wire is now available from **Techalloy Company, Inc.,** Rahns, Pa., because of a newly developed combination drawing and rolling process. Eliminating expensive machining operations, this new process creates shaped wire and rod of Monel, Inconel, Inconel X, Nickel and Techalloy Stainless Steels and other special heat and corrosion resisting alloys.

★ ★ ★

A wide variety of shapes in these drawn-and-rolled heat and corrosion resisting alloys can be specified. Maximum dimension must not be over one-half inch. There is no limit, however, on the small side for sizes down to .002" have been made.

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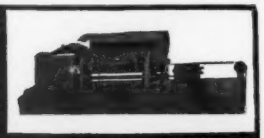
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★ ★ ★

Additional facts on Techalloy drawn and rolled shaped and flat wire are obtainable from manufacturer.

New Bulletin on Wire Partitions

The modern, economical approach to plant layout problems is described and illustrated in a new 8-page bulletin on Wipco Wire Partitions and Custom Enclosures just published by **Wire and Iron Products, Inc.**

★ ★ ★

Some of the practical, cost-saving features of Wipco Standard Partitions catalogued in the bulletin are: easy installation—each panel is a complete unit, interchangeable and moveable, and can be quickly assembled and installed by plant workmen; versatility and adaptability—the panels are reusable, and can be disassembled and relocated as plant layout changes require. Also described, are Wipco Custom Partitions, developed to meet the requirements of special enclosure and partition applications. Specification data is listed in table form for easy reference.

★ ★ ★

Bulletin P-55 available on request by writing Wire and Iron Products Inc., 1725 Sixteenth St., Detroit 16, Mich.

Structural Chemistry and Metallurgy of Copper

This paper, the 1956 Gillette Memorial Lecture of the **American Society for Testing Materials,** was presented by **Dr. D. K. Crampton,** Director of Research and Development, Chase Brass and Copper Co., Waterbury, Conn.

★ ★ ★

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some significant and relatively new facts concerning the behavior of copper and its alloys.

★ ★ ★

The lecture has been reprinted in pamphlet form (28 pages) by the ASTM and may be procured from them. The price is 75c to members and $1.00 otherwise. Address American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

Electric Cable from Japan

A recently concluded contract between the **Western Electric Co.**, Los Angeles, Cal., and Sumonito & Furakawa Cable Co., Japan, has resulted in an order for cable valued at 4.4 million dollars, at prices 14% under American prices and 19% under European quotations. Total orders of 8.1 millions have been placed with Japanese firms, the average price being 15% below domestic prices, according to reports.

(Briefed from Draht-Welt).

Faster Production in Austria

The manufacture of screws and bolts has risen sharply in the last few years and is placed at around 15,000 tons in 1956, which was 12% higher than 1955. About 25% of the production was exported. Except for 147 tons coming to America, Persia, Poland, Holland, Indonesia and Pakistan have been Austria's best customers.

(Briefed from Draht-Welt).

Correction

In the news item appearing on page 1471, December, 1956, on the winding of the Association's clock for 1957, **John M. Avison,** who wound the clock, has asked that the statement "is England's leading producer of brass brush wire" be amended to read: "one of England's leading producers of fine brass and zinc wires." He also states that the non-ferrous wires made by his company are mainly used in the asbestos industry for use in the manufacture of automobile and industrial brake linings.

New Hi-Temp Brazing Alloy

Handy & Harmon, 82 Fulton St., New York 38, N. Y., has announced a new line of high temperature brazing alloys for high strength bonding of stainless steel, steel, inconel, copper and other metals, the melting points of which are above the flow points of these brazing alloys, which range from 1820°F to 1930°F. These alloys and their applications are described in the company's bulletin #75, which is available upon request.

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Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CATALYSTS—For Fume Elimination
Oxy-Catalyst, Inc., Industrial Div., Wayne, Pa.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee Engr. Co., Cleveland, Ohio

CLOTH—WIRE, All Metals
Baker, James S., (Imports) Co., San Francisco, Calif.
Chase Brass & Copper Co., Waterbury, Conn.
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.

COMPOUNDS—Extrusion for Wire
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.

COMPOUNDS—For Improving Drawing & Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
Vascoloy-Ramet Corp., Waukegan, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Molina-Straus Diamond Products Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Molina-Straus Diamond Products Co., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Molina-Straus Diamond Products Co., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Drawing Angle Controlled
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., New York, N. Y.

DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adustable Speed
The Louis Allis Company, Milwaukee, Wisc.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio
Hubbard Spool Company, Garrett, Ind.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

ENGINEERS—Consulting
Wire Mill—Clarence S. Arms, Worcester, Mass.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS—
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Resisting Heating, Strand
Electric Furnace Company, Salem, Ohio

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio

FURNACES—Strand Annealing
Electric Furnace Company, Salem, Ohio
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GEARMOTORS—
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—
(See Alloys—Hardsurfacing)

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Kellogg Company, M. W., Chemical Manufacturing Division, Jersey City, N. J.

INSULATING MATERIALS—
Chemical Products Co., E. Providence, R. I.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire
Chemical Products Co., E. Providence, R. I.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The. Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Bobbin Winders
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Braiding
Carter & Co., Ltd., B. & F., Bolton, England
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Morgardshammer Mek Verstads A. B., Morgardshammer, Sweden.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven, Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Labeling Electric Wire
Dewyer, Inc., Libertyville, Ill.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Durant Mfg Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.

MACHINERY—Plating
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Printing on Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Pumps for Molten Metal
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Re-Spooling
Emory, Robert J., Co., Newark, N. J.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J
Wire Insulating Machinery Inc., Northboro, Mass.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Staple
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio

MACHINERY—Stranding
Carter & Co., Ltd., B. & F., Bolton, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Stripping Electric Wire & Cable
Burdwood, Howard A., Inc., Portland, Maine

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire
Emory, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Wire Drawing
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Fenn Mfg. Co., Newington, Conn.
Herborn, Herborn, Germany
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Morgan Construction Co., Worcester, Mass.
Morgardshammer Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wire Rope
Carter & Co., Ltd., B. & F., Bolton, England
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. & D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Rinkle, Krinkle Paper Co., Inc., Boston, Mass.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Rinkle, Krinkle Paper Co., Inc., Boston, Mass.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Company, Plymouth, Mass.

PATENT—ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.
Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.

PLASTICS COMPOUNDING—Custom
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

POINTING WIRE
Main, Robert A. & Sons, Inc., Paramus, N. J.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRINTING WHEELS—for Electric Wire
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois.

REEL AND TENSION STANDS—
Industrial Ovens, Inc., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., New York, N. Y.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Co., East Providence, R. I.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Company, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—(See Reels & Spools)

SPOOLS—Braider, Wire
Plastic Mold & Engineering Co., Providence, R. I.

SPOOLS—Stamped Metal for Retail Wire Sales
Mason Can Company, East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TABLES—Press Feeding
Jarke Manufacturing Co., Chicago, Illinois.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
Chemical Products Co., E. Providence, R. I.
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machinery Inc., Northboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIRE—Aluminum
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Camden Wire Co., Inc., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Pointed
Main, Robert A. & Sons, Inc., Paramus, N. J.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.

WIRE—Special Shapes
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Firth Sterling, Inc., Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

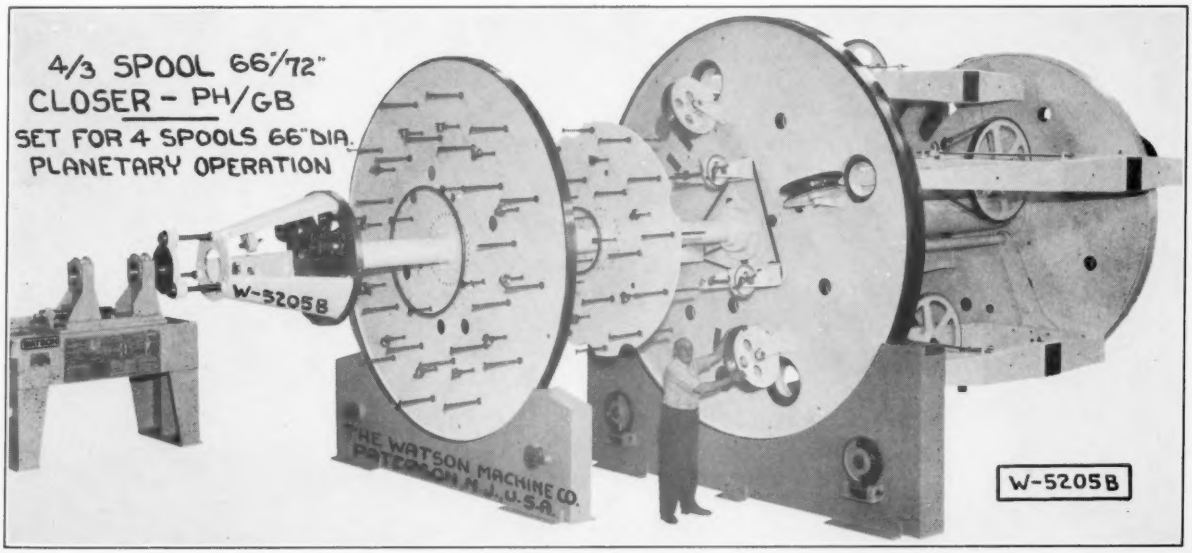
3 OR 4 SPOOL SECTOR CLOSER TYPE PH/GB

U. S. PATENT 2,270,093

AMONG THE NOTEWORTHY ADVANTAGES AND DESIGN FEATURES OF THIS LATEST CONSTRUCTION ARE:

POSITION-SHIFT-MOVABLE "SHAFTLESS" CRADLES. THEY SWING FROM 90° TO 120° RADIAL SPACING FOR RAPID CONVERSION FROM 4- TO 3- SPOOL HEAD BY REMOVAL OF ONLY ONE CRADLE. AXIAL ROTATION OF EACH CRADLE TO ANY DESIRED POSITION BY LOCKABLE, MANUALLY OPERATED WORM AND WHEEL. CRADLES HAVE NO-LOOSE-PARTS, INTEGRAL FRICTIONS, AND THE PATENTED "SHAFTLESS" DESIGN ELIMINATES SPOOL "SIDE-SLAP" AND REDUCES LOADING TIME TO A MINIMUM.

GEARED BACKTURN, PLANETARY OR RIGID. BY RAPID HYDRAULIC "POP-OFF" REMOVAL OF ONE CHANGE GEAR PAIR, MACHINE CAN QUICKLY BE CHANGED FROM PLANETARY TO RIGID FRAME OPERATION OR VICE-VERSA. REPOSITIONING OF BUT A SINGLE GEAR REVERSES HEAD ROTATION. MAIN DRIVE IS FULLY HOUSED AND FORCE-FEED LUBRICATED.



CUT W-5205b (LEFT HAND ASSEMBLY) ALSO SHOWS, LOCKABLE WORM AND WHEEL MAIN SUPPORT ROLLER ADJUSTMENT, PLANETARY DRIVEN "SLING-SHOT" CRADLES FOR GAS TUBES, 84 FILLER COP SPINDLES AND INDEXED LAY HEAD.

THE COMPLETE MACHINE IS 100 FEET LONG AND INCLUDES A TAPING SECTION, A 96" RING FLEETED SINGLE CAPSTAN, HYDRAULIC HEAD AND TAKEUP DRIVES AND A 96" SHAFTLESS MOTORIZED TAKEUP.

ADDITIONAL DETAILS AND ILLUSTRATIONS UPON REQUEST.

2-57

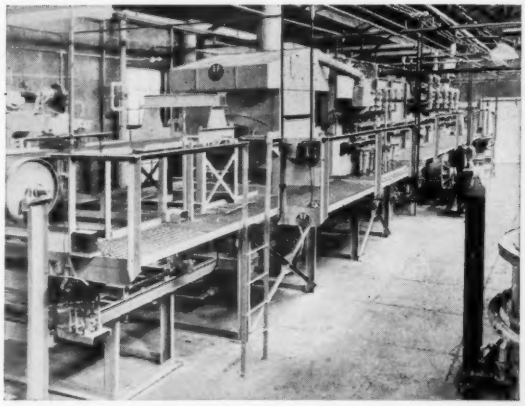
RESEARCH DEPARTMENT

available to

PRODUCERS and PROCESSORS

of metals and metal products

General view of the research department showing several of the continuous and batch type experimental furnaces.



View of combination gas-fired and electric continuous furnace equipped with flame preheating burn-off or oxidizing section and controlled heating, soaking and cooling zones, for producing various surface conditions on strip.

Direct gas-fired forced circulation bell type furnace for processing wire, rod, strip and other products

● The EF research department is equipped with gas-fired, oil-fired and electrically heated continuous and batch units including,—continuous wire mesh furnaces;—endothermic and exothermic special atmosphere generators;—forced circulation bell furnaces;—a continuous roller hearth furnace for treating commercial widths of ferrous and non-ferrous strip;—and other equipment.

Consequently, — from test runs — we can determine accurately the combination of temperature, time cycle, atmosphere and other factors needed to produce the exactly desired results,—assuring—in advance—the efficient performance of EF furnaces *fully up to specifications.*

Many large companies have drawn liberally upon this department in developing new products, and new techniques. Our facilities are available to YOU also — for YOUR research or development work, either gratis or for a moderate fee, depending upon the nature of the experiment. We will be glad to schedule time for your technicians.

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